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Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXIX NO. 9

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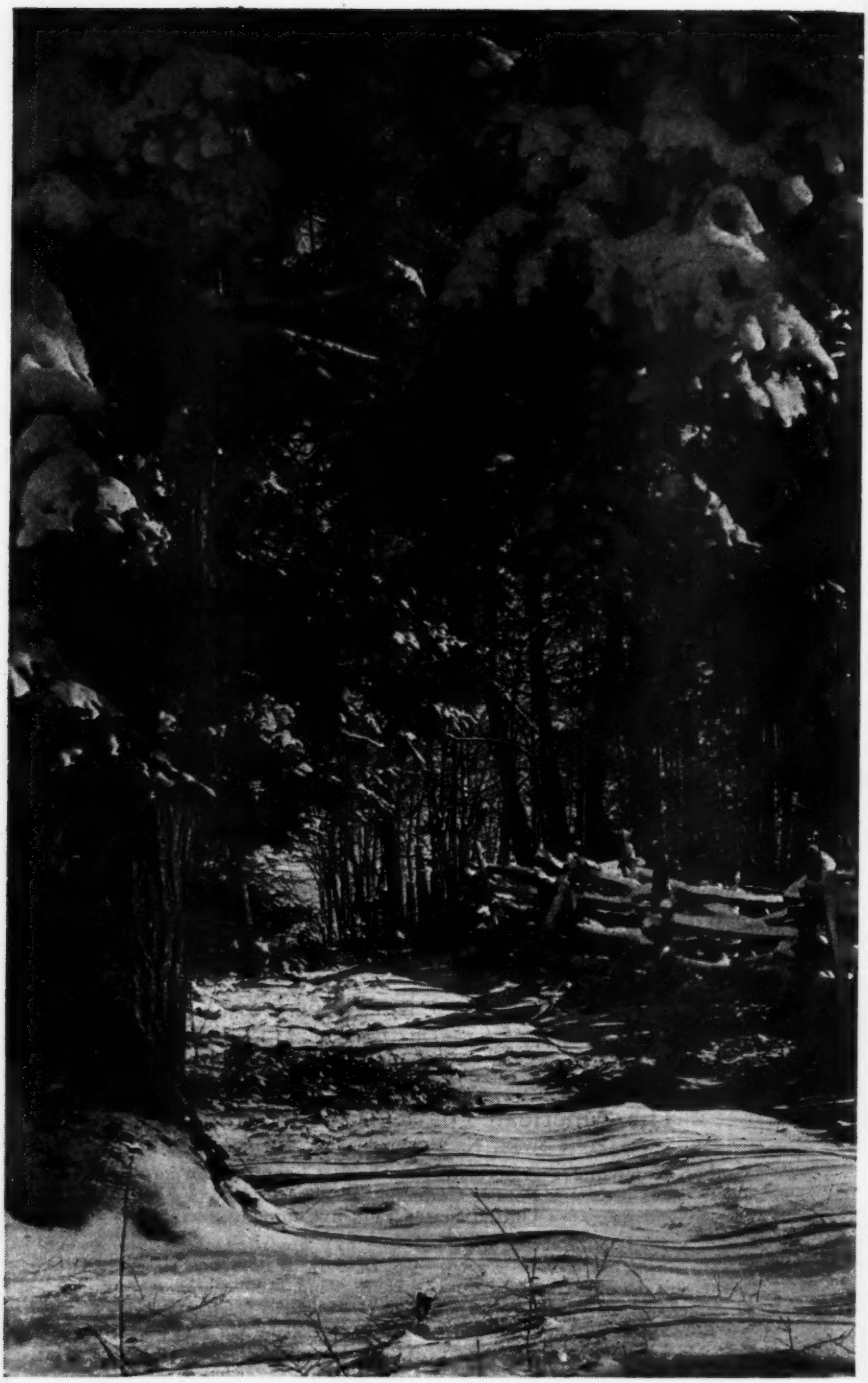

READY FOR RABBIT TRACKS

Better Crops with PLANT FOOD

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VOL. XXIX WASHINGTON, D. C., NOVEMBER, 1945 No. 9

Forensics in . . . . . .

Farmers' Forums

Jeff McDermid

MY earnest desire is that the advance of civilization and the renaissance now scheduled for us will not lay its paralyzing finger of conformity upon the voluntary assemblies of the soil. In other words, when they insist on using Robert's Rules of Order and the Jefferson legislative manual, you can bet it will crush all the original verve and quaintly refreshing spontaniety out of my favorite winter indoor recreation—reporting genuine dirt-farmer forums of free speech.

Presumably these gatherings to gab are distinctly an American product, and their origin was robust enough to give them a rousing start. Your dulled European peasant in days of yore had no chance to establish this kind of vocal marathon, in spite of an even greater impetus to hash over injustice. We had the opportunity, and the ever-ready excuse was not hard to cook up.

Beginnings of our rural forums were diversified. For the most part they were religious fervor and emotional pitch for the one kind, and a raw but robust form of political science for the other. At first it was the village church and the town meeting that drilled the speaking spirit into the bosoms of bucolic pioneers in our cradle communities.

As settlers moved westward this independent, outspoken tendency followed the Conestoga wagon and the trailside camp-fire, and roosted snugly in the rafters of the log cabins, ready to fly to the aid of him who stood in need of succor or reform.

It was through the lyceum, or debating society, and the backwoods' revival (protracted) meetings that the virility of farmers' forums were saved and strengthened.

These crude but fervid church sessions became known as "protracted"

meetings for no idle reason. They were continuous and lengthy affairs because sins and remorse were common ailments and the healing and consoling ministers were not numerous and had long journeys to make between congregations.

I HAVE at hand autobiographies by Rev. Peter Cartwright and Rev. Alfred Brunson, two of the type of forum leaders who rewarded those with native oratorical talent by naming them deacons and church wardens, with the power to keep the altar fires blazing all along the circuit. By "power" is not meant "pow-wow-er," although some vestige of that aboriginal trait clung like deerskin garments to those migrant rabble-rousers and sin-chasers.

In listing the speech-stimulating influence of the pioneer church or camp-meeting and the lyceum society, I have no intention of slighting the heart-warming, although elementary, influence exerted in this direction by the pioneer storekeeper. The best practice ground for talented but untried vocal prowess—before it got courage or skill enough to testify at meetings or debate public questions—was in the cluttered back corner of the general store, birthplace of that best loved of our American spokesmen, the cracker-barrel philosopher.

Here, to some extent and under proper nursing, some spark of this spontaneous speechifying amid the prunes, paint pots, and plowpoints seems to defy the modern radio in holding rural attention and respect. Indeed, to judge from broadcasters' own script writing, the country emporium still remains a source of some envy and imitation in this regard. As I have observed it, you cannot maintain this kind of vocal resiliency and freshness in primitive power unless the store and its sales systems are in tune with it.

Who can pause to hear a spellbinder when turnstiles, help-yourself shelves, and package checkers impede and restrict your visit to the grocery? And where is the brave philosopher who can find proper vantage point for his delivery in streamlined stores minus armchairs, spittoons, and cast-iron stoves? In these times of fancy sealed packages, whence cometh the sustenance so needful to sustain the orator amid his perorations?

There remain but few of these welcome places, some in odd corners of our farm zones, where the post office is left to intrigue waiting residents as well as to offer the last resort to the sadly vanishing tribe of opinionated observers. We should encourage merchants who cling to outmoded fixtures if for no other reason than to preserve this proving ground for vigorous vocabularies and freedom of native expression. To leave all this to the Future Farmers and 4-H clubs may seem wiser to the majority, yet these worthy institutions smack too much of schools and regulated procedures to awaken our vocal virility to the old boiling point—which camp-fires, revivals, and lyceums usually engendered.

IN this I ask you where is the agricultural extension medium of today who can conjure up a Paul Bunyan, Captain Kidd, or Bigfoot Wallace legend from his clients, or stimulate raw (unprocessed) philosophy about government, laws, and traditions, frankly and freely spoken? Today we are conscious always of precedent, of conforming, of being like other youth, of talking only of material gadgets and demonstrating pure technical methods —submerging and drowning imagination and primitive philosophy, lest it be "irrelevant or immaterial" to next year's farm program goals.

And alongside this standardization we have succeeded in cutting down the frequent use of strong, simple, and forceful Anglo-Saxon words and idioms —the kind that our Scotch-Irish forebears hewed out a wilderness with and used to elect officers and win wars. I do not wonder at the reluctance of amateurs to be outspoken in public nowadays, as the words are too long, and too many of them are imported

under a costly tariff of misunderstanding.

When I began making the winter rounds as a rural reporter we had farmers' institutes, farm-week short courses, and the conventions held by cooperative creameries and stock-shipping locals, plus the state conclaves of the United Farmers (apply your own respective titles). Thus there was a range for local talent to be vocal under varied incentives—the desire for new skill and knowledge, the economics and risks of mutual business, and the propaganda in behalf of the farming profession facing a competitive world of industry and finance.

Naturally they got all mixed up in a scrambled dish of opinions, because the bravest of leather-lunged delegates (forced into silence for a season afield) came down to any and all of these different meetings to uncork pentup theories and grievances at the first chance. So we had politics and economics injected at educational sessions, much to the dismay of the Dean and the faculty, and we had how-to-do-it chatter run in at our creamery meetings, and lots of religion and market quotations smuggled into the United Farmers conventions.

Scapegoats were led to the shambles to become shining sacrifices. Chief among these in my bailiwick were the State College of Agriculture and the Federal Department of Agriculture, as well as any and all laws and regulations which had been passed at the behest of agrarian pressure or advanced by legislators with honeyed intentions toward the grangers.

Those stout old debaters and floor-hoggers sweated harder at forensic forays in those turbulent times than they did at threshing bees. Serious, original, witty, and caustic, they removed the hides skillfully, rubbed in the salt, and stretched the skins on rigid frames to make a tanning job par excellence.

My only wonder as I sharpened my pencil to keep up with their sharper language was why in thunder they always scalped and flayed their erstwhile friends and industrial associates and let a whole woodsful of worse varmints escape their guns and traps. Some of them now admit the errors in tactics, when evils have grown beyond debate. Like the guy in the story, "They shot the wrong dog. The sheep-killer got away."

Competition among commercial radio stations and the efficiency of our state-owned educational broadcasters threatens to diminish the attendance at the rallying points of rural debate. If the programs were on the air for longer intervals, the stay-homers might feel the titillating effects blow-by-blow, just like the melee by air from the fistic fracas. Unfortunately the dismal spots they choose for broadcasting are, as a rule, the "welcome by the Dean," the "remarks by the mayor in greeting the grangers," or the highlights of the annual report. Yes, and maybe a blast or two from the FFA orchestra (with a complete professional band standing by to comply with union rules).

This parenthetical aside, by the way, really merits a finished essay carpentered by someone who isn't afraid to

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Kudzu on Abandoned Land Needs Phosphate and Potash Maybe Borax

By Ted C. Maurer

Agronomist, Spartanburg, S. C.

NOT all of the kudzu planted in the Southeastern States has made the growth and produced the feed expected of it. The idea that it should be planted only on the very poorest land—stick a piece of the plant (any part) in the ground and get out of the way before the fast growing vines wrapped you up —was rather prevalent for some years. Kudzu is a great plant, but still not that good.

Most of the early sites were selected because they were gullied, abandoned, and worn-out land. The preparation was inadequate; the crowns carelessly dug and cared for; the rate of fertilization light, if any; and the planting done half-heartedly. Much of this can be attributed to the lack of knowledge of kudzu's requirements and the slow acceptance of kudzu as a crop. Then, too, most all of the established kudzu had been allowed to run at will, and there was a definite fear that it would take over all the open land and woods.

Since the early days of the Soil Conservation Service when kudzu was first promoted as a crop, there has been collected a lot of valuable information about the establishment and uses of the crop which has in turn proven most of the fears unfounded. However, some of those early plantings have not come into production even with time, which usually has compensated for the lack of good planting practices and later fertilization.

Such stands were found in different parts of the Southeast on various soil types. A number of them were studied with the idea of determining just what kind of treatment it would take to make these stands produce a crop. Several typical sites were selected during the late winter of 1942 and a series of plots laid out on which potash (60% muriate) and phosphate (18% superphosphate) were applied at the rates of 200 and 600 pounds respectively, alone and in combination. After the fertilizer was applied, all of the plots were thoroughly disced.

On Mr. Franklin's Farm

One of the farms selected was H. A. Franklin's at Ellaville, Georgia. The land had been abandoned because of low yields of cash and feed crops. The farm had been planned as part of the Soil Conservation Service Project, with headquarters at Americus, Georgia. The planting was done in the spring of 1937 by the boys in the Civilian Conservation Corps camp. Since then nothing had been done to the kudzu and it had not made enough growth in the five years to cover the ground completely.

The soil is a Rustin Sand with about three-fourths of the topsoil washed away. It would very likely be class 3B according to the land use capability classification. Not a particularly encouraging layout, but there is a sizable area of such abandoned lands that will have to be covered soon.

By the end of the growing season of 1942, the effects of the fertilizer was very evident. The potash and phosphate plots were better than the checks,

but where the potash and phosphate were applied together at the rates of 200 and 600 pounds per acre, the kudzu had covered the ground completely. There was no room for doubt as to the best plots.

This abandoned land is producing a crop again, but the kudzu needed help to get a good start after a five-year struggle. These plots will continue to be observed from time to time. This past spring identical applications of potash and phosphate were repeated on these same plots.

The old saying "the proof of the pudding is in the eating" is well demonstrated by Mr. Franklin's cow that was grazing in the field where the kudzu plots are located. It was interesting to watch her. She would graze across an area of about 20 yards, turn, and go back. Since the plots had been restaked, we could see that she would graze about three bites beyond one line of stakes before turning. When we checked that particular area, we found that it was one of the plots on which potash and phosphate had been applied in combination. The cow knew there was a difference, but she could not tell us except in the amount and quality of the milk and her general good condition.

All this top growth is in addition to the hidden root growth that is building the soil.

The use of borax on kudzu may prove as startlingly effective as it has on alfalfa. Near Augusta, Georgia, kudzu was not making the growth expected and needed to control erosion even with liberal amounts of fertilizer and sewage sludge. Rather late in the season (June 1945) four plots were laid out on which borax was applied at the rate of 20 pounds per acre alone and in combination with 200 lbs. of potash per acre.

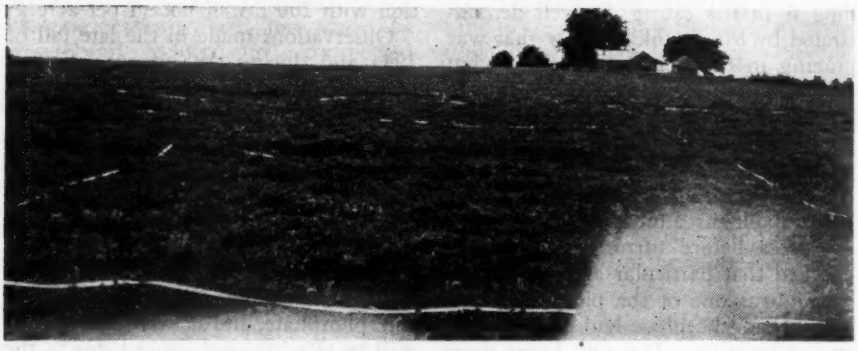
Observations made in the late fall of 1944 and during the present growing season indicate that the borax is beneficial to the growth of the kudzu. The plot with the borax and the potash was the best. No definite conclusions can be drawn or recommendations made, but the indications are interesting to say the least.

Another series of plots was established in Stewart County, Georgia, with potash, phosphate, and borax. These plots will be of additional interest due to the fact that crowns were dug from this field during the winter 1944-5. Not

Photo Courtesy U. S. Army Signal Corps

On the plots in the strip above, potash and borax were applied to the top plots (upper left) and to the bottom plot. The two in the center were check plots.

Potash alone



Phosphate alone

Check plot in the foreground. Right above the check plot is the potash and phosphate plot where the cow grazed back and forth without missing the edge three bites.

only can the effect of all the elements on the top growth be studied, but the root development can be determined.

Information on root development has not received much consideration up to date. There is a definite possibility that quality kudzu crowns will be in good demand. The production of such crowns should get some attention so that the demand can be supplied. There are many thousands of acres of abandoned and marginal land that needs to be covered with kudzu for erosion control and the production of high quality, home-grown protein hay. In addition

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What Is the Best Method of Applying Fertilizer?

By George R. Cobb

Salisbury, Maryland

IN his "Farmer's Manual," written in 1819, Frederick Butler has this to say in regard to successful farming: "We are all sensible that two great evils have uniformly obstructed the attainment of this great objective; the one is where the farmer runs too hastily into new and visionary schemes and the other when he adheres too obstinately to such old practices as are obviously bad."

Farmers have not changed much during the 125 years since his book was written, for they rushed into band placement too fast and without sufficient evidence that this method would work on their soils, their crops, and under their conditions, and as a result many band-placement machines are now rusting away under sheds or behind barns. In the past two or three years farmers have followed the same headlong rush to apply fertilizers on the plow sole or bottom of the furrow.

Changing Methods

It is true that methods of applying fertilizers are changing and today more farmers are plowing under fertilizer. Tomato growers in Delaware who contract with Libby, McNeil, and Libby are turning to plowing under the fertilizer because one year two of the first three prize-winners followed this method in growing their prize crops. In New Jersey in 1940, according to Dr. Tiedjens, not more than one per cent of the tomato growers plowed under the fertilizer despite the fact that the Department of Vegetable Gardening had recommended this practice since 1936. Since 1941 the number of growers following this practice has rapidly increased so that by 1944 approximately 50 per cent of the growers are plowing under all or part of the fertilizer. Reports from other states confirm this trend, but as with the other methods of applying fertilizer plowing under has its drawbacks as well as its good points.

At the 1944 Annual Meeting of the Vegetable Growers of America Dr. H. C. Thompson of Cornell reviewed and analyzed the experiments in placing fertilizer as reported by the Joint Committee on Fertilizer Application and concluded from this study that no one method was best under all conditions. He compared six different methods of applying fertilizer—broadcast before plowing, broadcast after plowing, applied in bottom of furrow, applied in bands, part of fertilizer in furrow and remainder in bands, and drilling in the fertilizer 3 to 4 inches deep. Professor C. B. Sayre in reporting for the Northeast confirmed Dr. Thompson's conclusion that in such a large number of experiments, conducted under exceedingly different conditions of soil, rate, and kind of fertilizer, it is impossible to make any general recommendation for all types of conditions. However, Professor Sayre does say that generally speaking it appears that on the heavier types of soils the results are inclined to favor deep applications, particularly plowed-under; while on light soils more shallow applications, such as the band method or side-dressings, are indicated. When small amounts of fertilizer are applied, the band method seems to give the best results.

The plow-under method of applying fertilizer when applied before plowing would seem to be best on heavy soils and in dry seasons, but with soils low in pH the fixation of phosphorus is greater under this method than when the fertilizer is placed in bands or in the furrow. In a report from New York State, 800 lbs. of fertilizer broadcast and plowed under yielded but 4.82 tons of tomatoes per acre as compared with a yield of 7.91 tons when the fertilizer was applied half in the furrow and half in bands. This soil had a pH of only 4.8, thus the heavy fixation of P when broadcast. Professor Sayre explains this by saying that on very acid soils with a high capacity for fixing P, fertilizer applied in bands or on the furrow bottom is exposed to less soil surface and thus the fixation is less than when broadcast and plowed down. But he continues, "On the other hand, on soils not having such a high fixation capacity, the band or furrow method did not show any advantage over the other methods of applying the fertilizer."

Dr. J. B. Hester, Campbell Soup Company, recommends on medium and heavy soils that the nitrogen should be plowed down or disked in or the N and K plowed under with P in the row or all plowed under and a starter solution should be used. He further advises that on very light soils, for tomatoes, there is a question about plowing down the nitrogen as so much may leach that the plants will lack this element before the season is ended. Good results have been obtained on well-limed soils by plowing down or disking from 1,000 to 2,000 lbs. of a 5-10-10 or 4-8-8 fertilizer. In 1939, those growers who placed high nitrogen in the row raised but 8 tons of tomatoes per acre while those who put the same amount on broadcast or applied it as a side-dressing got an average yield of 15 tons per acre. Dr. Hester sums up the question as follows: (1) apply potash, a small amount in the row and the rest as a side-dressing; (2) apply the bulk of the fertilizer broadcast and disk or plow under before the plants are set with some in the row at planting time on heavy soils; (3) pre-fertilize the cover crop; and (4) use proper systems of band placements.

Broadcasting the fertilizer after plowing would seem to be the least preferred method. Dr. Thompson found in his survey that this method gave a larger number of lower yields than any other method, and it was especially poor on heavy soils. However, this method was very good on sandy loams. There is likely to be more fixation under this method when small amounts of fertilizer are applied, and in dry seasons this practice has given very poor results. It is, nevertheless, one of the safest methods of applying large amounts of fertilizer to light, well-drained soils, but for best results should be combined with one of the other methods.

Results of Furrow Application

Applying all of the fertilizer in the bottom of the furrow produced more low yields than any other method. Reports from New York State on tomatoes indicate that 800 lbs. in the bottom of the furrow gave the lowest yields of the six methods tested, but when 400 lbs. were placed in the furrow and 200 lbs. in bands, the yield was the highest of all methods tested. This method of placing the fertilizer in the furrow bottom is better in dry seasons than applying it on the surface, and there is less fixation of P and K under this method. As it takes some time for the roots to reach the fertilizer when placed in the furrow bottom, it is advised that either a starter solution be used or a small amount of fertilizer be placed in the row, in the hill, or in bands close to seed. From New Jersey comes the report that when only P was placed deeply and N and K were side-dressed, the yields were as good, if not better, than when the complete fertilizer was placed in the subsoil.

In growing peas for canning, Maryland found that placing the fertilizer in

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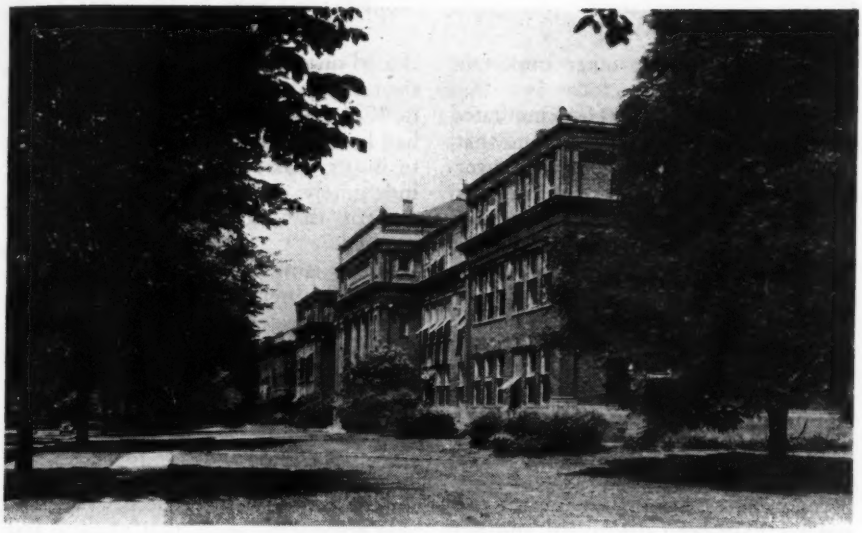


"The wealth of Illinois is in her soil, and her strength lies in its intelligent development." Above: Old Agriculture Building, University of Illinois.

First Things First in Soil Fertility

By A. L. Lang

Department of Agronomy, University of Illinois, Urbana, Illinois

ADOPTING into general agriculture practical systems of farming that will restore to the soils their virgin fertility and permanently maintain a high productive capacity is still the first and foremost material farm problem not only in Illinois but in all of the United States.

Food for plants is just as necessary as food for animals, but as agricultural leaders and educators, we still have to make producers and consumers conscious of the fact. Wartime production goals to increase feed, food, and fiber have seriously sapped our soils of their vital growth-producing substances. This stepped-up exploitation of the soil is leading rapidly to soil depletion, soil erosion, gullying, and abandonment.

TABLE 1. CROPPING WITHOUT LEGUMES REDUCES YIELDS, MUMFORD PLOTS, M9, 1943.

Rotation	Green Manure	Corn yields bu.		
		8 yr.	1943	Diff.
Corn, Wheat...	Sw. cl.	82	80	2
Corn, Oats.....	Sw. cl.	84	74	10
Corn, Oats.....	None	72	59	13
Corn, Soybeans.	None	74	54	20

As the fertility of the soil goes, so goes industry, government, and civilization. Every form of agriculture rests primarily on the productiveness of the land, and agriculture to a large extent

supports most of the other important industries.

In 1907 Dr. Cyril G. Hopkins stated before the State Farmers Institute that,

"If we succeed in Illinois in discovering, demonstrating, and practicing permanent systems of profitable agriculture, this State will be the first example in the history of the world of adopting agricultural methods that will maintain the fertility of the soil without the purchase of food and fertilizers from foreign nations."

Records from the Illinois soil experiment fields, established by Hopkins, as well as the records from many farms, stand out as monuments to and prove beyond any reasonable doubt that such systems have been discovered and that they have been demonstrated.

TABLE 2. FARM LAND THAT HASN'T WORN OUT, ILLINOIS SOIL EXPERIMENT FIELDS, 4-YEAR AVERAGE CORN YIELDS, 1940-1943.

Location	Land not treated	Treated with M. L. P.	Increase
	Bushel	*Bushel*	
Aledo	76	112	36
Kewanee	75	108	33
Carthage	57	101	44
Mt. Morris	67	100	33
Dixon	69	101	32
Mc. Nabb	66	101	35
Lebanon	54	103	47
Average	66	104	38

M–manure; L–limestone; P–rock phosphate.

During the past four years, 1940-1943, an emergency period when demand for high production was greatest and when fertilizing supplies were hardest to get, seven of twelve soil experimental plots on dark-colored soil produced an annual average yield of 103.7 bushels of corn per acre. This was an increase of 38 bushels per acre annually over the untreated land on the same fields. More significant than the record itself is the fact that these yields were secured during the 1940-43 emergency period without having purchased or applied a single pound of off-the-farm fertilizer since 1924. Previous to 1924 limestone and rock phosphate had been applied in sufficient quantities to insure maximum production for an indefinitely determined time, and the end of that time has not yet been reached.

In the same period, under exactly the same treatment conditions as stated above, six experimental plots on light-colored soils in the southern part of the State produced an annual average acre-yield of 31 bushels of wheat, an increase of 25 bushels an acre annually over the untreated land on the same fields.

How unfortunate, indeed, when the war emergency arose, that practice and adoption had not kept up with discovery and demonstration. After two such wars in 25 years the road ahead should be clear. Every effort, individually and collectively, should be made to conserve and replenish the soils with an abundance of materials that will insure continuous and permanent economical agricultural production. This aim is entirely feasible as indicated by the encouraging progress of the past, even though that progress may have been slow. Illinois farmers alone have applied during the past 25 years 25,000,000 tons of agricultural limestone on Illinois soils. They are now applying limestone at the rate of more than 3,500,000 tons annually. If this can be continued for 15 to 20 years, all of the acid soils in the State will have been limed sufficiently to support maximum soil-building legume crops; and that is a fundamental step in a permanent and economical agricultural program. Other states, too, are following this lead. Some are increasing their use of limestone so rapidly that they may even soon pass us in annual applications.

In addition to limestone, rock phosphate, superphosphate, potash, and supplementary fertilizers are being used to the full extent of available supplies. However, even this stepped-up usage does not begin to maintain these important plant-food elements. Illinois

alone would have to apply more than 10,000,000 tons of rock phosphate or its equivalent, and 200,000 tons of potassium chloride in the next 10 years to replenish and maintain in its soils the fast diminishing supplies of these materials.

Usage figures are encouraging from the farmers' standpoint. They indicate that even under pressure of war emergency and much advertising, farmers are still keeping scientifically sound, permanent, and profitable soil-building methods uppermost in their minds.

Let us as leaders be sure that we do not stray from the fundamental truths in the excitement of research findings which constantly supply newer, more glamorous, and brighter prospects. For fear of straying, it is well to recall again and again the steps and the order of their sequence in a permanent and economical soil fertility program.

Recommended Steps

1. If needed, establish and maintain good drainage; where necessary, use supporting practices—contour farming, grass waterways, and terraces to keep soil, water, and plant food in place.

2. Invoice the soil's acidity and plant-food requirements by making soil tests, tissue tests, observing plant symptoms and planned field trials.

3. Correct soil acidity; supply calcium and magnesium by the use of agricultural limestone.

4. Where deficient, supply phosphorus and potassium in quantities sufficient to replace all losses by crop removal or otherwise at maximum production levels.

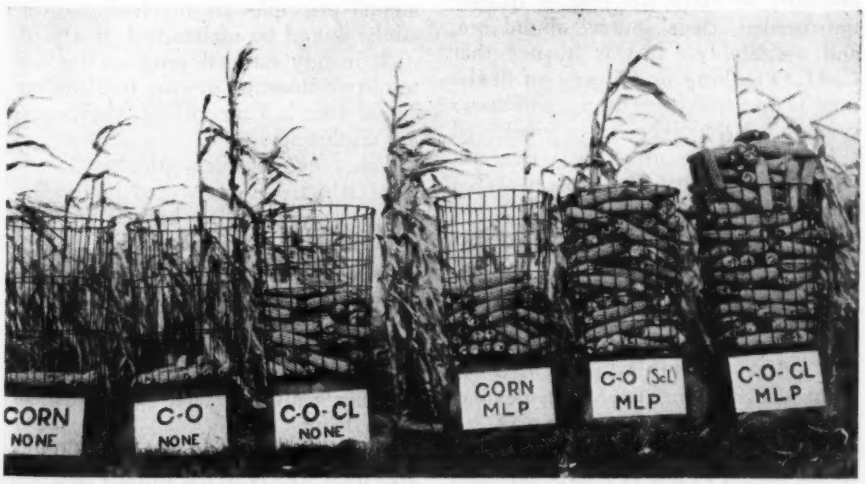
5. Establish cropping systems with proper balance between intertilled, small grain, and grass-legume sod crops.

6. Maintain a desirable physical condition in the soil, insure maximum water-holding capacity, and supply adequate nitrogen by judicious utilization and careful conservation of legumes, crop residues, and animal manures.

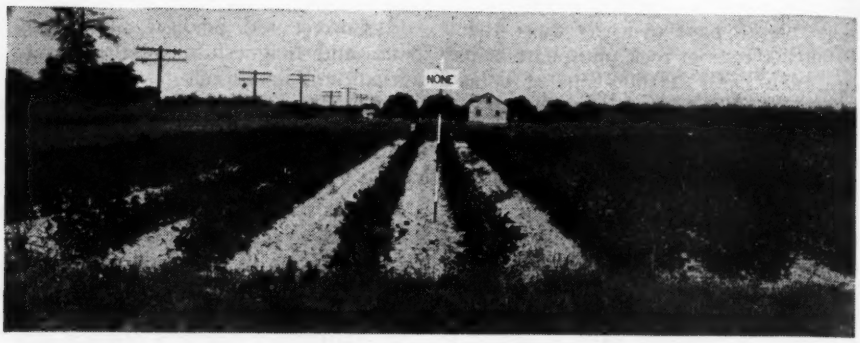
Elaboration on some of the steps outlined above will help to make them more thoroughly understood.

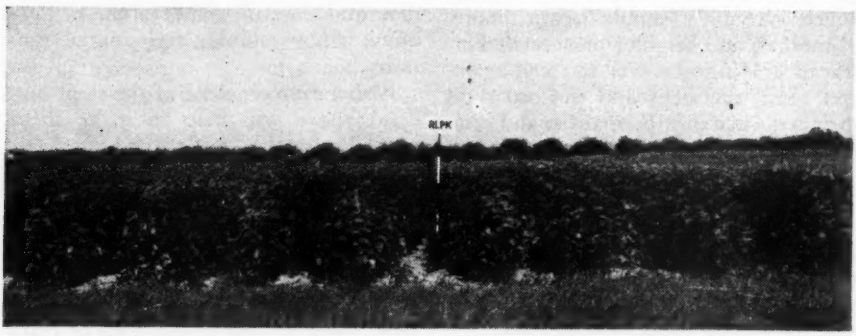
Leading to their crystallization was the defining of fairly well-established physical and chemical facts.

Important physical facts are those of seed, home, light, temperature, and water. The chemical facts established were those related to nutrition or plant food. The kind of chemical elements required to grow normal plants was defined. They were C, H, O, N, P, K, S, Ca, Mg and Fe; more recently others



The 1943 corn yields from Morrow plots. The 68th crop from these old experimental plots demonstrates soil exploitation and soil productivity maintenance. From left to right, bushels per acre, 16, 26, 53, 60, 84, 100.





Soybeans respond well to good soil treatment as do all other crops on southern Illinois light-colored soils. Above: No treatment. Below: Residues, lime, phosphate, potash.

have been added. Having determined the kind of food plants live on, it was necessary to know the relative quantities needed, their source, abundance, and availability. It was learned that C, H, O making up 95 per cent of the total plant came from the air and water surrounding it. The soil seemed well supplied with Fe and S, only traces of which were needed by the plant. That left N, P, K, Ca, and Mg to be taken care of. These elements come from the soil and are used by the plant in fairly large quantities. Unproductive soils are usually quite deficient in one or more of them. For these reasons many ways and means of returning these necessary plant-food elements have been devised. The Illinois system of permanent soil fertility is one. Because of the requirements for N, P, and K a large fertilizer industry dealing in these materials has grown up.

A Yard Stick for Comparison

In deciding what to do, three fundamental principles are involved and certainly should be maintained as a yardstick in any rational program for soil fertility restoration or crop fertilization. These are: 1. Economy, 2. Sufficiency, 3. Permanency.

Take, for example, agricultural limestone which has been used in the Illinois system instead of burned lime. It is more easily obtained locally, and it is cheaper than burned lime. The economy of limestone has encouraged larger initial applications and wider use. Because of these facts and the further fact that it lasts longer in the soil, it is exerting a much greater influence than burned lime.

Rock phosphate recommended highly and used widely in the Illinois program is another example of how an effective economical product encourages suffi-

cient applications during time of prosperity and gives permanency and stability during times of depression.

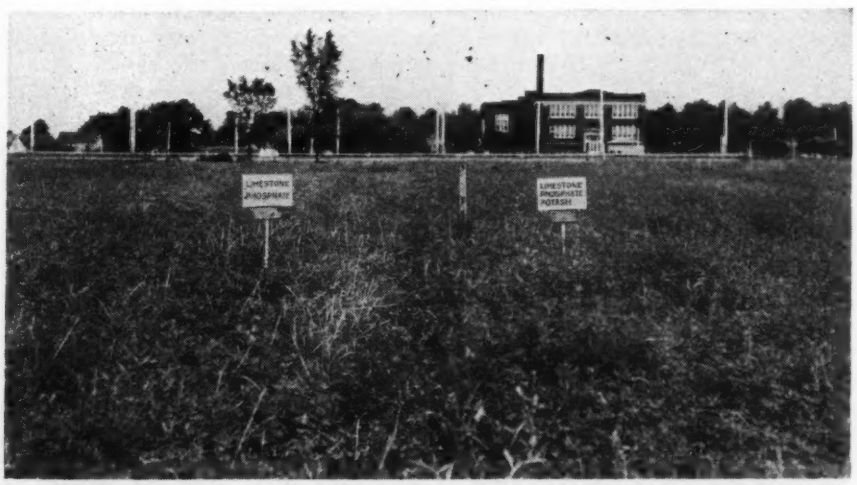
Likewise, legumes, animal manures, and crop residues utilized properly in the cropping system are a fundamental part of the philosophy of economy, sufficiency, and permanency. Legumes gather nitrogen from the air's abundant supply and return it to the soil. They also supply necessary active organic matter along with other residues to give tilth, aeration, water-holding capacity, and life-giving energy to the millions of essential soil organisms.

Thus far in our program very little has been said about potash. It is a well-known fact that plants require relatively large quantities of this nutrient and where not available in soils, yields are notably low and of poor quality. Potash deficiencies have long been recognized in the peaty alkaline swamp areas and also in most sandy regions. However, when analyzed, silt and clay loams of Illinois showed high potassium content, resulting in the conclusion that this large supply of natural potassium in the soil could be freed for use by plants, if legumes were grown and all plant residues were returned to the land. This theory worked out in practice for a time, but when yields were increased by the use of limestone, phosphate, and legumes, and by high-yielding new crop varieties, it was obvious that potassium deficiencies were limiting yields. Potash fertilization is now playing a very important role and it is apparent that its application to and maintenance in the soil will be one of the major problems confronting Illinois farmers in the future.

TABLE 3. POTASH DEFICIENCIES DEVELOP ILLINOIS SOIL EXPERIMENT FIELDS 1910-1943.

Location	Increases for potash* Light-colored soils Corn yields bushels		Diff.
	First 8 years	Last 8 years	
Oblong.....	2	25	23
Toledo.....	7	32	25
Raleigh.....	4	22	18
Ewing.....	7	27	20
Enfield.....	4	21	17
Average...	5	24	19

* Potassium chloride in addition to limestone, rock phosphate, legumes, and crop residues.



Potash helps limestone and phosphate to grow legumes and supply the much-needed nitrogen on light-colored soils of southern Illinois. Left: Limestone and phosphate; right: limestone, phosphate, and potash.

TABLE 4. POTASH DEFICIENCIES DEVELOP ILLINOIS SOIL EXPERIMENT FIELDS 1910-1943.

Location	Increases for potash* Dark-colored soils Corn yields bushels		Diff.
	First 8 years	Last 8 years	
Carlinville...	3	12	9
Carthage....	0	4	4
Clayton.....	4	10	6
Dixon.....	4	7	3
Lebanon....	3	7	4
Mt. Morris..	0	7	7
Average...	2	8	6

* Potassium chloride in addition to limestone, rock phosphate, legumes, and crop residues.

Rather striking data from five soil experiment fields on light-colored soils in southern Illinois and from six fields on dark-colored soils emphasize the importance and seriousness of this problem. These fields have been operating since 1910 to the present date, and over a period of 34 years, it is possible to compare findings of the first eight years of experimentation with those of the last eight years. Looking at corn yields for the first eight-year period on the five light-colored soils we find there is an average increase of five bushels an acre annually for potash salts over limestone, phosphate, crop residues, and legumes. In the last eight-year period potash gave an average increase of 24 bushels per acre, a difference of 19 bushels. Even on dark soils there is a difference of six bushels an acre in response between the two periods—the first period showing two bushels for potash and the last period showing an eight-bushel increase.

The road to permanency in agriculture has been outlined, mostly paved, and partially used. During this time of prosperity the plan should be widely and enthusiastically acclaimed lest its use be stopped completely when lower incomes prevail.

In the future, fertilizing materials other than those in common use will constantly present themselves for consideration in the scheme of things. Certain superphosphates have always been with us and others are coming to the front very fast. When and where they should fit into the outlined program can be readily determined by applying the yardstick of economy, sufficiency, and permanency. At present prices superphosphate is more costly than rock

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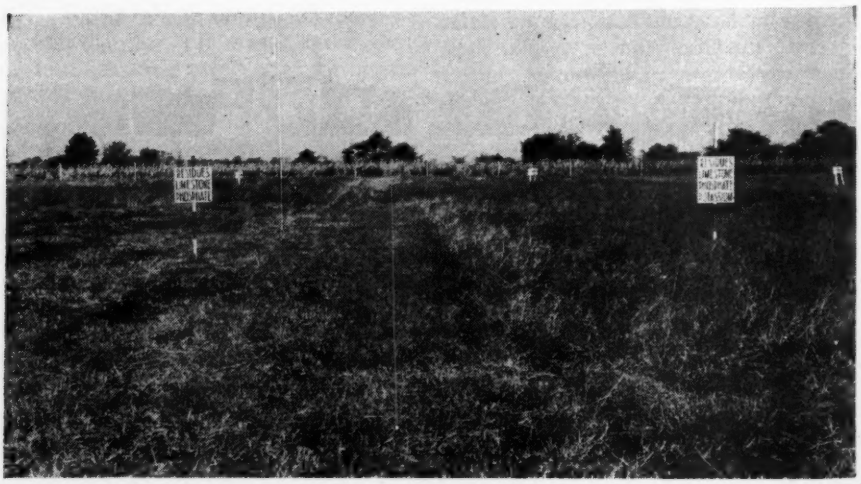


Another instance where potash made the difference in growth of legumes. Left: Residues, limestone, phosphate; right: residues, limestone, phosphate, potash.

Potash—In War and Peace

By Dr. J. W. Turrentine

Washington, D. C.

WITH the greatest war in history now behind us and with the equally great task of reconstruction now confronting us, any statement of facts pertinent to America's potash problem perforce must relate to the war years, for what lies ahead is still too nebulous to discuss realistically. At the same time, the future must be contemplated if thereinto we are to advance with any hope whatever of maintaining an economy under which our much cherished way of life can survive. While this is the Nation's problem, it is likewise the problem of each one of us who in the aggregate contribute to and in fact comprise the national economy. We whose activities are devoted to the promotion of agricultural prosperity recognize not only our responsibilities but likewise the intimacy with which our own prosperity is tied in with that of the farmer. That puts farmer interests foremost and thereby clarifies for us the objectives toward which our own reconstruction planning must be directed.

In contrast to the uncertainties of the future, the war-years' record of performance of the American potash industry is clear and is one in which the Nation takes pride, bestowing thereon the praise earned in common with industry in general for its all-out contribution to the winning of the war.

The potash industry, with the outbreak of war in Europe and long before Pearl Harbor, foresaw the role which it might be called upon to play in providing agriculture with an essential plant food and proceeded promptly to expand its production capacity. This process of expansion had to be continued up to the present to keep abreast of the ever-expanding demands of agriculture. Finding itself the only available source of potash outside of Axis domination, it assumed the responsibility of supplying also the requirements of Canada on a rapidly increasing scale, of the American chemical industry, increasing its demand sixfold, and with quotas set aside for Lend-Lease shipments to other friendly nations. To supply these many and essential requirements, production was increased from 250,000 tons K_2O in 1938, the last normal prewar year, to the present production rate of 892,000 tons K_2O per year.

This tonnage is the output of five production units, namely, three mines and refineries in New Mexico, a large refinery in California, and a smaller one in Utah.*

Production and Deliveries

This expansion with its attendant risks, it is significant to note, was undertaken voluntarily, was privately financed, and was accomplished without Federal aid; no accurate measure could possibly have been had of the hazards to be confronted post-war. Throughout this period the problems of labor supply and rising wages, priorities on and allocations of machinery and supplies, and box-car scarcity had to be solved in common with industry in general operating at maximum capacity under war conditions. Despite

* For a description of these plants and their operation see "Potash in North America," published by the Reinhold Publishing Corp., 330 West Forty-Second Street, N. Y.

mounting costs of production, there was no increase in wholesale price of the products of mines and refineries, even prior to the orders of the Office of Price Administration.

Typical of this production record is the calendar year of 1944, during which deliveries of potash for agricultural use reached a new high. Figures released by the American Potash Institute covering deliveries for that calendar year by the five major producers show a total of 806,367 tons K_2O contained in 1,380,446 tons of salts delivered in the United States, Canada, Cuba, Puerto Rico, and Hawaii. This represents an increase of 98,041 tons K_2O or 15.7% over 1943, the previous high year.

Muriate of potash, 60% grade, was by far the most popular material, representing 77.7% of the total K_2O. The two sulphate forms, sulphate of potash and sulphate of potash-magnesia, made up about 8% of the total; the 50% muriate of potash grade 7.2%; and manure salts 7.1%. Most of the increase in potash delivered was in the form of 60% muriate of potash, with the sulphate forms and the 50% muriate grade also above 1943. Manure salts deliveries were a little behind the preceding year.

Deliveries for agricultural purposes in the United States totaled 652,260 tons K_2O, an increase of 13.6% over last year. This potash went to 40 states and the District of Columbia, one more state than last year.

The eight leading states for potash deliveries in 1944 were Georgia, Ohio, Virginia, Florida, North Carolina, Illinois, Maryland, and South Carolina, in the order named. Each took more than 40,000 tons K_2O. This list contains the same states as in 1943, but there is a significant shift in the order. Ohio was second and Illinois sixth in 1944; while in 1943, these states were fifth and eighth, respectively, indicating the increasing importance of the Midwest as a market for potash.

Canadian deliveries reached a record total of 44,629 tons K_2O in 1944, an increase of 33.7% over 1943. Deliveries in Cuba were 2,831 tons, an increase of 158% over the preceding year; while Puerto Rico took 15,191 tons K_2O, an increase of 32.8%. Deliveries to Hawaii were 8,336 tons K_2O, 67.1% over 1943.

Deliveries of potash salts for chemical use in 1944 were 133,343 tons of salts containing an equivalent of 83,120 tons K_2O, a reduction of 1,247 tons

Potash Deliveries
Short Tons K_2O

Agricultural	Calendar year 1944	Calendar year 1943	Oct.-Dec. 1944	Oct.-Dec. 1943
United States:				
Muriate 60%	503,082	431,146	133,059	113,827
50%	50,266	48,420	14,748	13,531
Manure salts	47,971	49,006	9,305	16,546
Sulphate and Sul. Pot.-Mag.	50,941	45,731	14,156	12,753
Total	652,260	574,302	171,268	156,657
Canada	44,629	33,377	12,551	10,217
Cuba	2,831	1,096	1,172	217
Puerto Rico	15,191	11,443	3,312	25
Hawaii	8,336	4,988	2,412	92
Total Agricultural	723,247	625,206	190,715	167,208
Chemical Potash	83,120	84,367	21,127	23,958
Grand Total	806,367	709,573	211,842	191,166

Potash Deliveries
Short Tons K_2O
(United States, Canada, Cuba, Puerto Rico, Hawaii)

	Jan.-March 1945	Jan.-March 1944
Muriate	176,614	156,132
Manure salts	14,722	23,454
Sulphate and Sul. Pot.-Mag.	15,409	13,746
Total agricultural	206,745	193,332
Chemical potash	24,475	21,164
Grand total	231,220	214,496

K_2O or 1.5% under 1943. This potash went to 26 states and Canada. The muriate form comprised 97.8% of the total K_2O.

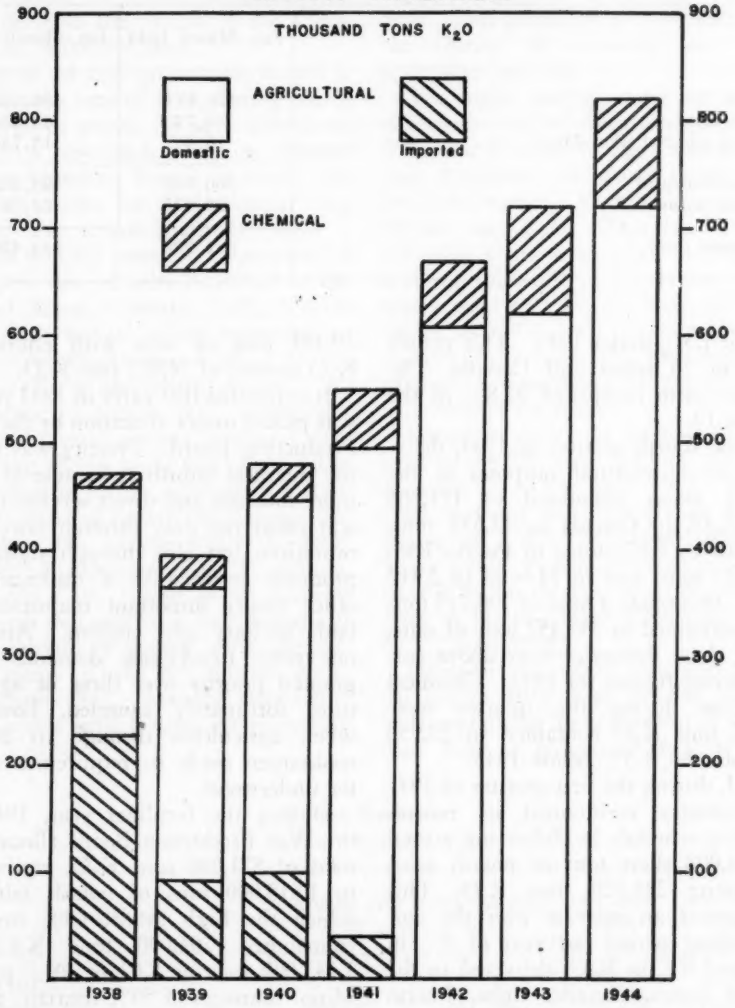
In the fourth quarter of 1944, deliveries for agricultural purposes in the United States amounted to 171,268 tons K_2O, in Canada to 12,551 tons, in Cuba to 1,172 tons, in Puerto Rico to 3,312 tons, and in Hawaii to 2,412 tons. This made a total of 190,715 tons K_2O contained in 357,352 tons of salts. All of these deliveries were above corresponding figures for 1943. Chemical deliveries during the quarter were 21,127 tons K_2O contained in 33,956 tons of salts, 1.5% below 1943.

And, during the first quarter of 1945 the industry maintained its record-breaking schedule by delivering a total of 434,008 short tons of potash salts, containing 231,220 tons K_2O. This represented an increase over the corresponding period last year of 2% in salts and 8% in K_2O, delivered in the United States, Canada, Cuba, Puerto Rico, and Hawaii, by the five major producing companies, according to data released by the American Potash Institute. Deliveries for agricultural use amounted to 394,575 tons of salts with an equivalent K_2O content of 206,745 tons. Making up this total were 297,498 tons of muriate of potash, 55,570 tons of manure salts, and 41,507 tons of sulphate of potash and sulphate of potash-magnesia. Deliveries for chemical use amounted to 39,433 tons of salts with equivalent K_2O content of 24,475 tons K_2O.

It is recalled that early in 1943 potash was placed under allocation by the War Production Board. Priority was given the chemical industries because of their more intimate and direct services to the war effort not only through providing munitions but also through supplying products essential to a multitude of other vitally important manufactures, both military and civilian. Also, at one time, Lend-Lease demands were granted priority over those of agriculture, fortunately canceled, however, when agriculture through its official spokesmen made its requirements better understood.

During the fertilizer year, 1944-45, the War Production Board allocated a total of 871,000 tons K_2O, equivalent to 1,618,000 tons of potash salts, of which the high grade, 60% muriate contributed 704,000 tons K_2O, or 1,141,000 tons of KCl of 98% purity. Minor tonnages of 50% muriate, potassium sulphate, and sulphate of potash-magnesia were also included. Of this total, United States agriculture (including Puerto Rico and Hawaii) was allocated 718,000 tons K_2O, an increase of 114,000 tons over the corresponding allocation of 1943-44. Included also were 98,000 tons K_2O allocated to chemical and metallurgical industries, 42,000 tons to Canada, and 15,000 tons to the Foreign Economic Administration.

POTASH DELIVERIES: AGRICULTURAL & CHEMICAL, NORTH AMERICA



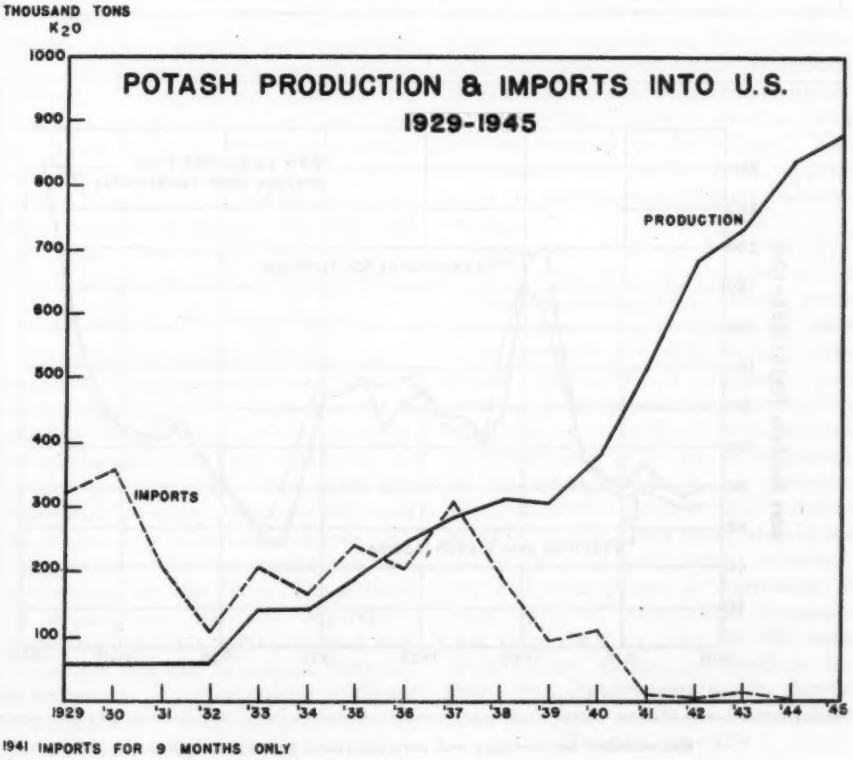
This record of achievement is summarized in the accompanying chart, "Potash Deliveries: Agricultural and Chemical, North America."

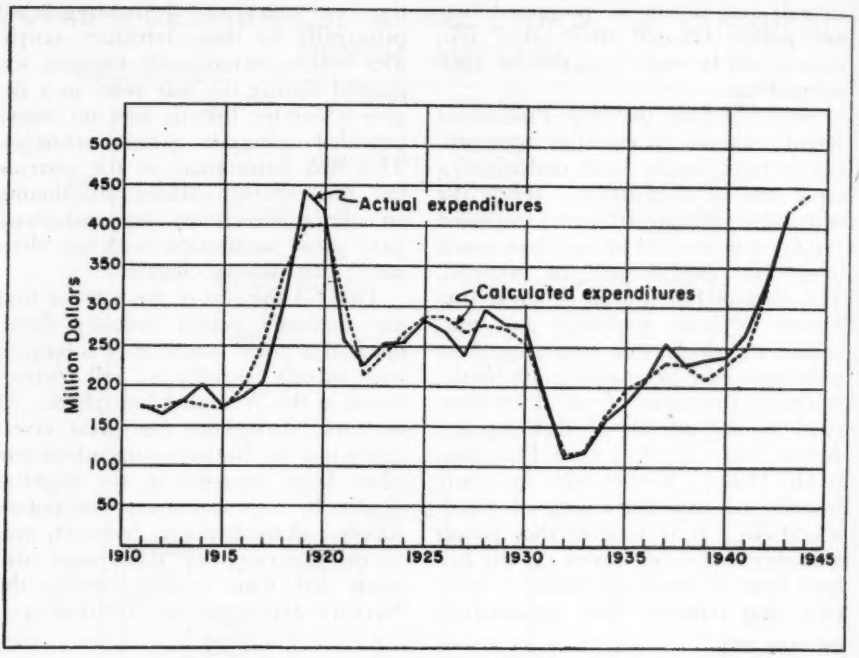
For the current fertilizer year, 1945-46, the War Production Board had under allocation as of June 1, 1945, an estimated total of 892,000 tons K_2O, of which 724,000 were assigned to agricultural use within the United States, Puerto Rico, and Hawaii. Of the balance 103,000 tons K_2O were assigned to chemical use, 45,000 tons to Canada, and 19,000 tons to FEA and other exports, allocations now subject to change with the change from war to peace which has intervened. It is still too early to forecast what shifts in demand will result from reconversion, it appearing obvious that those applications of potash salts in munitions production will be among the first to be discon

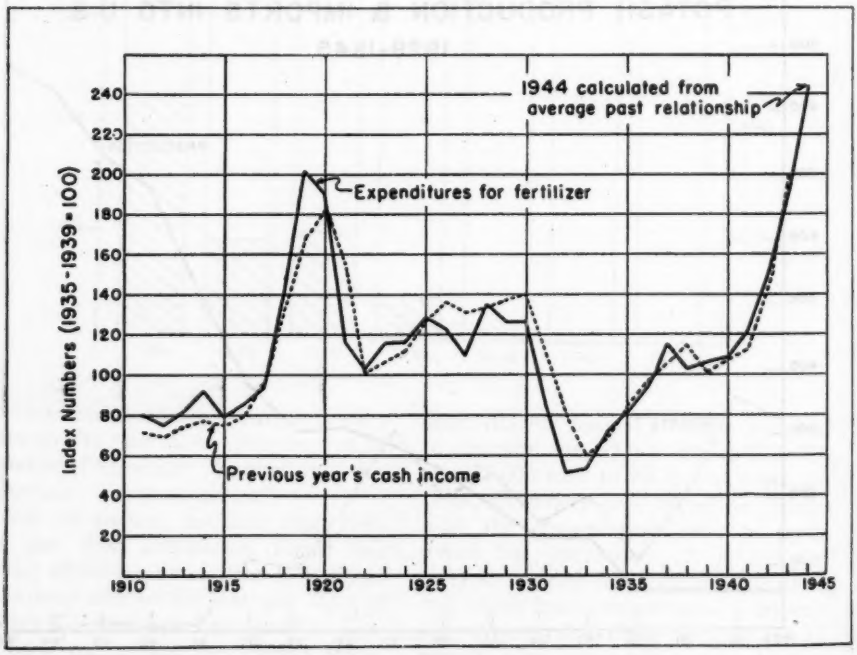
tinued; and it can be presumed that any potash released from other allocations will be made available for agricultural use.

Since V-J Day, the War Production Board's controls of essential commodities in tight supply have undergone a rapid rate of elimination. While the demand for potash still seems to exceed supply, it remains to be seen how much longer its control will be retained. This control has proven of great usefulness to both producers and purchasers of potash, due to the excellent judgment and firm adherence to the equitable treatment of all alike, exercised by the officials of that Agency. Among those meriting special mention is Mr. Dale C. Kieffer who for many months was in active charge of potash allocations. It is recalled that potash was allocated to all buyers on the historic base of prior purchases, a principle that received wide approbation, the few exceptions being registered principally by those fertilizer companies whose mixed-goods business expanded during the war years to a degree where the historic base no longer provided adequate potash tonnages. This was unfortunate in the extreme but unavoidable without abandoning an allocation system that otherwise gave great satisfaction with no alternative that was not chaotic.

Thus, at the end of the war we find our domestic potash industry developed to a point where it is supplying with success virtually the full requirements of the Western Hemisphere. At no time throughout our great emergency has the Nation's stupendous war effort been impeded in the slightest degree by any inadequacy of potash supply. Apprehension, however, was to the contrary, for there were still many left who recalled vividly the Nation's experience in World War I,







Expenditures for fertilizer and previous year's cash farm income.

when, at its outbreak, we were caught with scarcely a vestige of a potash industry of our own, prior thereto our dependence on the German potash monopoly being absolute. Even as recently as 1937 we still were importing 50% of our supplies from the European Potash Cartel. Perhaps it did call for considerable credulity on the part of those who were not familiar with the competence and courage of our newly developed industry to visualize the achievement which is now a matter of record.

But now we come to reconstruction and face the future which depends so absolutely upon the success with which we reorganize ourselves back upon a peacetime basis. We have seen agriculture at an all-time high economic level, enjoying that state of prosperity which results from full employment. At that level of income the farmer has bought and used unprecedented tonnages of fertilizers and has demanded as never before the high-analysis grades, a farm income, and a tonnage that called for 718,000 tons K_2O in 1944-45. Unemployment confronts us, but it is yet too early to see how soon it will be before it results in a reduction in the consumption of farm products. The American people like their three square meals per day and will get them so long as they have the price, and to that a job is the first essential.

Fertilizer and Farm Income

Farm prosperity depends on employment. That relationship is a matter of record. Likewise the gross tonnage of fertilizer purchased in one year is determined by the gross farm income of the preceding year. This relationship has held with uncanny constancy for many years past as shown by numerous articles published by the economists and statisticians of the U. S. Department of Agriculture. It is a dependable guide and is the only economic law seemingly that can be applied with any definiteness in forecasting fertilizer consumption. Since potash currently is retailed almost exclusively as a mixed-goods ingredient, the same law applies also to potash consumption. These relationships are plotted in the accompanying charts, "Expenditures for fertilizer and previous year's cash farm income."

This subject has been competently and realistically discussed in the U. S. Department of Agriculture publication, "Plant Food Memorandum Report No. 11," prepared for the Committee on National Fertilizers and Lime Policy of that Department by Dr. F. W. Parker, Assistant Chief, Bureau of Plant Industry, and his staff, in our opinion constituting one of the most useful discussions of the subject of fertilizers issued by that Department.

In forecasting the plant-food consumption by United States agriculture five years hence (1950), the state of over-all national employment and the resulting gross farm income are recognized as the determining factors. Thus, three sets of economic conditions are considered: Full employment, with a gross farm income of $16.5 billion; some unemployment, with an income of $12 billion; and considerable unemployment (depression), with a farm income reduced to $8 billion. The conclusions reached on these suppositions are summarized in the tabulation on page 42.

From this tabulation it is seen that with the full play of economic forces controlling consumption, namely, gross farm income which relies on the state of employment providing workers with money wherewith to purchase farm produce at fair prices, the consumption of potash in agriculture may amount to 650,000 tons if we are so competent in the management of our domestic economy as to maintain "full employment." On the other hand, should we fail in that vitally important undertaking and thus permit a depression to come upon us, then potash consumption may drop to only 380,000 tons. With partial success, intermediate between full employment and a depression, there may result the intermediate

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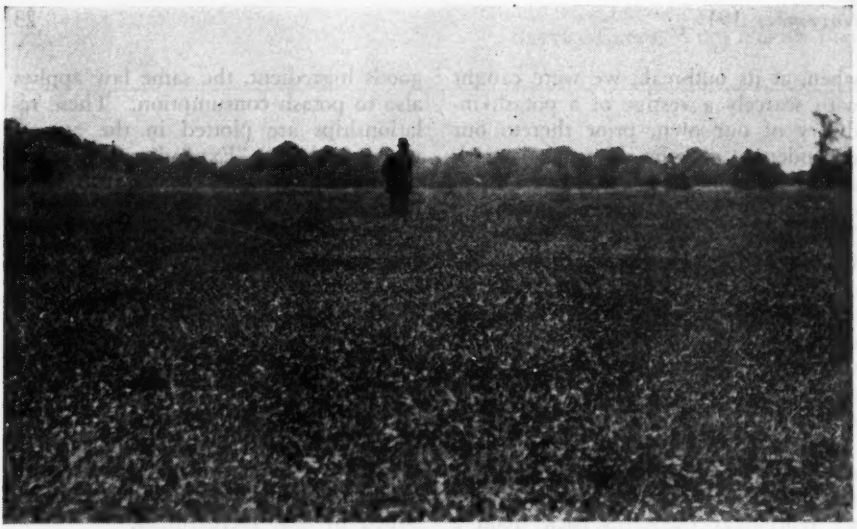


A borax-crimson clover demonstration in Franklin, the Nation's largest crimson clover seed-producing county. The noticeable effect of the borax here was to ripen the seed heads about three days earlier.

Borax on Crimson Clover in Tennessee

By H. E. Hendricks

Extension Agronomist, University of Tennessee, Knoxville, Tennessee

CRIMSON clover is the most important winter legume produced in Tennessee. In 1944, there were seeded over 400,000 acres in this State. It is also an important winter legume in portions of the states bordering Tennessee, and large acreages are seeded along the eastern shore.

Successful early seeded crimson clover is the most productive fall, winter, and spring pasture of any crop produced in this State, and its value as a green-manure crop either on land pastured or unpastured is not surpassed by any other winter legume.

As a companion crop seeded with small grain or ryegrass, it also adds materially to the pasture possibilities, and the combination adds to the erosion-control and green-manure value of small grains when turned under.

Tennessee produces approximately 50 per cent of all the crimson clover seed grown in the United States, and the possibilities for expanding seed production in this State will be more favorable with the advent of additional seed harvesting machinery. The principal hazard in producing crimson clover for pasture, green manure, or seed is securing a satisfactory stand of clover, because of the weather conditions at the time it should be seeded for the greatest value both to the land and for a pasture crop. In the mountain areas of the State it should be seeded in July, and for the remainder of the State by August 20, when it is

being seeded primarily for pasture. Unfortunately, during these most favorable seeding dates the rainfall expectancy is very undependable.

Crimson clover, being small seeded and having a shallow root system in the seedling stage and requiring very little moisture to sprout it, often perishes soon after emergence due to insufficient moisture in the land. It naturally follows, therefore, that if some simple practice which would eliminate any hazards in securing a stand could be found, it would favorably affect the possibilities of expanding crimson clover acreage in this State and would materially affect the cropping system and livestock production program.

Demonstrations Established

Naftel, of the Alabama Station, was the earliest observer to note that borax applied to the land before seeding crimson clover assisted in maintaining a stand of the tender seedlings during dry periods following emergence.

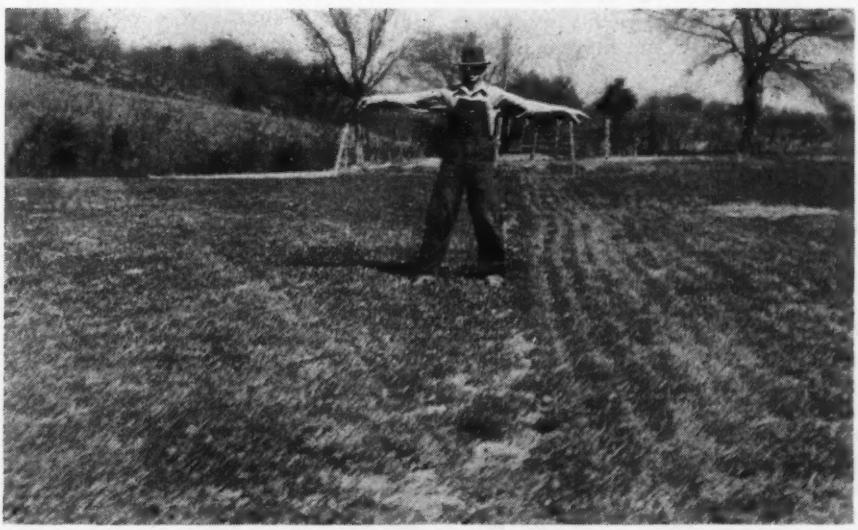
In 1942, in five different counties in various soil areas of the State, it was decided to establish one-acre demonstration plots using 25 pounds of borax per acre to determine if borax applied to land which was to be seeded to crimson clover would: (1) assist in securing and maintaining a stand under adverse weather conditions; (2) increase the growth of the crimson clover for grazing purposes; and (3) increase the amount of seed to be harvested.

Field observations were made in the spring of 1943, and the effects were as follows: three reported either increases in stand or growth of clover, one reported no difference, and one reported it having been seeded so late it froze out.

The three demonstrations showing outstanding results were in Franklin County, the largest crimson clover seed-producing county in the country, and T. L. Mayes, County Agent, reported: (1) a thicker stand which withstood the drouth better; (2) treated area ripened the stand three days earlier; (3) a significant increase in seed yield; and (4) larger seed.

A sample of this seed was submitted by the county agent from both treated and untreated areas and they were analyzed by the State Seed Analyst for size of seed. The Seed Analyst, however, reported that the difference in size was insignificant from a laboratory standpoint.

T. W. Hillsman, County Agent in



A demonstration with the use of borax on crimson clover in Giles County. Note density of stand at right; also evidence of grazing by livestock.

Madison, a West Tennessee county, reported that the beneficial results on the demonstrations in that county that year were on the gray lands, which usually have poor under-drainage. Hillsman reported further that there was a distinct difference in the growth of the borax-treated area, and that the plants withstood the winter with a lower mortality as compared with the untreated area.

The Knox County demonstration in East Tennessee showed beneficial results from borax treatment on the portions of the land that were gravelly and drouthy.

1943 Results

Since moisture conditions at seeding time in 1942 were adequate to secure a stand of clover in all places where the demonstrations were carried on, it was decided to continue the demonstrations. Accordingly, demonstrations of the same nature were established in 1943 in 16 different counties. In 1943, there was again a favorable season for establishing stands of crimson clover and the results obtained were similar to those reported the previous year. The writer had an opportunity to observe about half of these demonstrations in the spring of 1944, some of which showed outstanding benefits from borax application, and some showed little or no benefits.

One interesting report was received from L. E. Hewgley, County Agent in Giles County, and I quote from his report:

"We established seven demonstrations on farms in this county. I have observed these demonstrations personally with the following results being most outstanding: (1) Considerably better stand was obtained on treated area, and better survival of young plants was particularly noted. (2) There is a big difference in color in the treated and untreated areas, the treated showing a much greener and darker color. Some of the farmers report that the livestock tend to graze the treated area in preference to the untreated area. (3) Earlier and more pasture was furnished on the treated area. (4) Some of the demonstrators feel that the application of borax is justifiable on crimson clover.

"We had a very outstanding demonstration on the farm of Mr. J. F. Hayes, which was very impressive, showing most of the advantages mentioned above. However, the difference is not as distinct now as it was earlier in the season."

Since conflicting results were obtained from applications in both the fall of 1942 and 1943, it was decided in 1944 to establish quite a large number of demonstrations to see whether it could be determined with finality whether we would recommend in the future an application of borax on crimson clover in much the same manner that we do for alfalfa production. Accordingly, 59 different counties agreed to establish a total of 869 demonstrations, using 25 pounds of borax per acre on a one-acre plot of ground, having an untreated area on one or more sides of the treated area.

In the spring, the writer had occasion to visit a few of these demonstrations and results have been received either directly from the farmer-demonstrator or from county agents on approximately 20 per cent of the total number of demonstrations.

1944 Results

The fall of 1944 was again abnormally favorable for securing stands of crimson clover so that the effect of borax in obtaining a stand of crimson clover in dry weather after seeding is still not answered satisfactorily for Tennessee conditions even after this large number of demonstrations. Looking over these reports and calculating the best I can, about 45 per cent of those reporting received an increase in the stand of crimson clover where borax was applied, about 55 per cent reported no increase. About 55 per cent reported an increase in the amount of growth of the plant where borax was

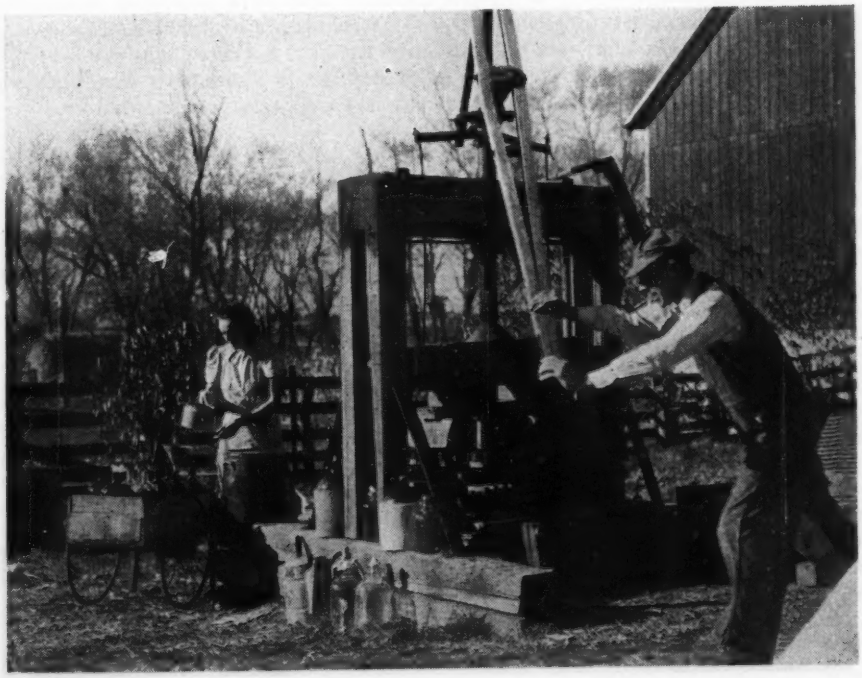
(*Turn to page* 41)

PICTORIAL

THE WATER FOUNTAIN OF THE ONE-ROOM SCHOOL

TURKEY DINNERS AND STEAKS IN THE MAKING.

SORGHUM AND APPLE CIDER ON THE WAY.



Above: Illinois—marsh grass and aquatic plants plus a few rods of fence transformed a muddy farm pond into a small recreation center providing hunting, fishing, and swimming.

Below: South Carolina—trees were planted in 1937 along U. S. Highway 221 which is shown at the right. The picture was taken in the fall of 1941.

The Editors Talk

A New Era for Agriculture

Secretary of Agriculture Clinton P. Anderson, speaking before the National Association of Commissioners, Secretaries, and Directors of Agriculture at Memphis, Tennessee, on November 12 gave the farmers of the Nation their "honorable discharge."

"The farmers have completed their war job," he said. "They faithfully fulfilled each of the huge war goals for food, fiber, fats, and oils. And now agriculture has to *convert* from what it has become during wartime to what it wants to become in the promising years ahead. The U. S. farmer is fortunate in many ways as he faces this conversion. His financial position is solid. He has earned a good income, has reduced his debts to low levels, and has a nest egg in bank deposits, cash, and U. S. bonds. He has his government's pledge that the prices of his war-expanded crops will be supported, if necessary, at not less than 90 per cent of parity for two years. He has national production adjustment and surplus handling machinery and he knows how to operate it. But probably most important, farmers and all of us interested in agriculture now have a 'breathing spell,' which we should use for a 'thinking and planning spell.' We are *not* up against desperate situations, as in 1933, that demand wholesale emergency action. However, we can't waste any time; we can't drift along until the problems now ahead overwhelm and panic us with their urgency. Now—right now—is the time to dig up facts, to appraise them honestly, to develop needed unity in our thinking, and to make sound plans for the future of a strong and prosperous modern agriculture."

Secretary Anderson believes that the logical starting point in this planning should be a parity income goal that would give agriculture a fair share of the national income, while encouraging the most efficient use of our agricultural resources. And because we know that full employment is the common goal of both industry and agriculture, the parity income goal should be agriculture's fair share of the national income under full-employment, full-scale industrial activity.

He sees many methods that could be used in reaching this goal and some difficulties with any method chosen. Regardless of the difficulties, however, we must face the fact that farmers are entitled to and must have a fair share of the national income. One of the ways of assuring that fair share is to develop a system of parity prices that encourages the kind of an agriculture the Nation needs, one that is not tied rigidly to the past, but is flexible enough to allow us to look to the needs of the future.

Dwelling briefly on additional methods that can be used by farmers and Government to help mold the pattern of agricultural production toward that needed in a full-employment economy, he feels that a national program to stabilize the consumption of agricultural products would, in effect, prevent declines in effective consumer demand. Some program of this kind could go a long way toward supporting farm prices by keeping people in the habit of eating good diets.

"Another device, and one that we have used in the past with good effect, is for

the Government to offer temporary incentive prices, as it did during the war, to increase production of commodities that otherwise might fall short of consumer demand.

"Also, we should not forget the Ever-Normal Granary in our thinking and exploring of the future. . . . The part the Ever-Normal Granary plays in any program for agricultural equality is highly important. We no longer have to fear moderate seasonal surpluses, because we now have the machinery to handle them—commodity loans to carry the extra supply over from year to year without breaking the price, and acreage adjustments to be made if necessary to shift acreage up or down. These have come to our rescue again and again in time of drought or great need, and we will need to continue to use this device in the years ahead."

And last but not least, the Secretary emphasized, is our need to take stock of our agriculture as it is today and as it will be tomorrow, entirely aside from the problem of prices. How are we going to improve our land-use to produce crops more efficiently, to make full use of the technical advances that are here and are coming? How are we going to achieve the full measure of conservation of our agricultural resources—our soil, water supply, and forests? How are we going to develop an expanded, free-moving trade with other nations, to broaden the whole base of our economy, provide increased opportunities for employment, and aid in preserving world peace? All of these things must be considered, if we hope to plan for a genuine parity, a complete equality, for agriculture.

U.S.D.A. Urges Early Buying Of Fertilizer

Although started as a wartime necessity, the practice of farmers storing fertilizer during the winter months has demonstrated its practicability and advantage to the user, says the U. S. Department of Agriculture, who again is urging farmers to do their fertilizer buying early. In advising farmers to make sure they will have their fertilizer on hand when needed, L. B. Taylor of the Production and Marketing Administration stated that "while supplies of raw materials to make fertilizers are estimated to be slightly more than in the 1944-45 season, there is the possibility of production and delivery congestions which will be more acute if farmers wait to the last minute to order out their fertilizer. The early movement of fertilizer is the key to a plentiful and satisfactory distribution of plant food in 1946 just as it was in the previous years." It is estimated that last spring about 30 per cent of all the fertilizer used had been in farm storage for at least a part of the winter.

The Department offers the following good suggestions for storage: (1) Be sure to store fertilizer in a dry building where the flooring is above the ground. Never store fertilizer on the earth itself. (2) Stack bags close together to reduce the absorption of moisture from the air. (3) Exercise care in handling fertilizer so as to avoid breaking bags, as loose fertilizer would damage the good bags. (4) Make separate stacks of mixed fertilizer, superphosphate, ammonium nitrate, or any other type of material. This makes it easier to clean up and keep separate if accidentally spilled. (5) As a precaution keep sodium nitrate and ammonium nitrate away from hay, feeds, and organic meals to prevent fires and be sure to burn all empty bags from which the sodium and ammonium nitrates are emptied. (6) Protect farm animals by keeping them away from stored sodium nitrate and ammonium nitrate which might be injurious if eaten by them.

Farm Prices of Farm Products*

	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
1910–14 Average	12.4	10.4	69.6	87.6	64.8	88.0	11.94	21.59	....
1920	32.1	17.3	249.5	175.7	144.2	224.1	21.26	51.73	....
1921	12.3	19.5	103.8	118.7	58.7	119.0	12.96	22.18	....
1922	18.9	22.8	96.7	104.8	58.5	103.2	11.68	35.04	....
1923	26.7	19.0	84.1	104.4	80.1	98.9	12.29	43.69	....
1924	27.6	19.0	87.0	137.0	91.2	110.5	13.28	38.34	....
1925	22.1	16.8	113.9	171.6	99.9	151.0	12.54	35.07	....
1926	15.1	17.9	185.7	156.3	69.9	135.1	13.06	27.20	....
1927	15.9	20.7	132.3	114.0	78.8	120.5	12.00	28.56	....
1928	18.6	20.0	82.9	112.3	89.1	113.4	10.63	37.70	....
1929	17.7	18.6	93.7	118.4	87.6	102.7	11.56	34.98	....
1930	12.4	12.9	124.4	115.8	78.0	80.9	11.31	26.25	....
1931	7.6	8.2	72.7	92.9	49.8	48.8	9.76	17.04	....
1932	5.8	10.5	43.3	57.2	28.1	38.8	7.53	9.74	....
1933	8.1	12.9	66.0	59.4	36.5	58.1	6.81	12.32	....
1934	12.0	17.1	68.0	79.1	61.3	79.8	10.67	26.12	....
1935	11.6	16.1	49.4	73.9	77.4	86.4	10.57	35.56	....
1936	11.7	17.2	99.6	85.3	76.7	96.0	8.93	31.78	....
1937	11.1	19.9	88.3	91.8	94.8	107.1	10.36	30.24	....
1938	8.3	17.2	55.5	76.9	49.0	66.1	7.55	21.13	....
1939	8.7	15.4	68.1	75.4	47.6	63.6	6.95	22.17	....
1940	9.6	16.0	70.7	85.2	59.0	73.9	7.62	24.31	....
1941	13.3	26.4	64.6	94.4	64.3	84.0	8.10	35.04	....
1942	18.51	36.9	110.0	108.3	79.5	101.8	10.05	44.42	....
1943	19.84	40.5	149.2	196.7	102.7	127.3	12.82	48.26	....
1944	20.39	41.8	141.0	213.5	133.3	142.8	15.43	52.80	....
October	21.25	41.2	142.0	185.0	113.0	142.0	15.20	52.70	....
November	20.78	45.1	143.0	164.0	106.0	143.0	15.60	53.40	....
December	20.85	43.5	150.0	175.0	106.0	145.0	16.50	53.10	....
1945									
January	20.20	41.9	158.0	190.0	107.0	146.0	17.10	52.80	....
February	19.99	31.8	165.0	201.0	106.0	147.0	17.70	52.70	....
March	20.24	21.4	171.0	207.0	107.0	148.0	18.10	52.00	....
April	20.20	21.4	174.0	211.0	107.0	149.0	16.90	51.90	....
May	20.51	42.2	177.0	214.0	108.0	149.0	16.50	52.10	....
June	20.90	51.2	180.0	220.0	111.0	150.0	15.90	52.50	....
July	21.25	56.3	183.0	230.0	112.0	146.0	15.40	55.00	....
August	21.33	44.9	167.0	256.0	113.0	145.0	14.60	52.50	....
September	21.72	43.2	138.0	207.0	112.0	145.0	14.30	51.40	....
October	22.30	45.9	126.0	180.0	113.0	151.0	14.30	51.00	....
Index Numbers (1910-14 = 100)									
1920	259	166	358	201	223	255	178	240	....
1921	99	187	149	136	91	135	109	103	....
1922	152	219	139	120	90	117	98	162	....
1923	215	183	121	119	124	112	103	202	....
1924	223	183	125	156	141	126	111	177	159
1925	178	161	164	196	154	172	105	162	153
1926	122	172	267	178	108	154	109	126	143
1927	128	199	190	130	122	137	101	132	121
1928	150	192	119	128	138	129	89	174	159
1929	143	179	135	135	135	117	97	162	149
1930	100	124	179	132	120	92	95	122	140
1931	61	79	104	106	77	55	82	79	117
1932	47	101	62	65	43	44	63	45	102
1933	65	124	95	68	56	66	57	57	105
1934	97	164	98	90	95	91	89	121	104
1935	94	155	71	84	119	98	89	165	126
1936	94	165	143	97	118	109	75	147	113
1937	90	191	127	105	146	122	87	140	122
1938	67	165	80	88	76	75	63	98	101
1939	70	148	98	86	73	72	58	103	109
1940	78	154	102	97	91	84	64	126	121
1941	107	254	93	108	99	95	68	162	145
1942	149	355	158	124	123	116	84	206	199
1943	160	389	214	225	158	145	107	224	245
1944	165	402	203	244	175	162	129	245	217
October	171	396	204	211	174	161	127	244	192
November	168	434	205	187	164	163	131	247	188
December	168	418	216	200	164	165	138	246	228
1945									
January	163	403	227	217	165	166	143	245	262
February	161	306	237	229	164	167	148	244	223
March	163	206	246	236	165	168	152	241	203
April	163	206	250	241	165	169	142	240	259
May	165	406	254	244	167	169	138	241	193
June	169	492	259	251	171	170	133	243	269
July	171	541	263	263	173	166	129	255	244
August	172	432	240	292	174	165	122	243	240
September	175	415	198	236	173	165	120	238	159
October	180	441	181	205	174	172	120	236	181

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Fish scrap, wet acidulated 6% ammonia, 3% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.05	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	3.54	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.25	4.59	5.16
1924	2.99	2.44	5.87	5.02	4.41	3.60	4.25
1925	3.11	2.47	5.41	5.34	4.70	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.15	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.35	4.32	5.70
1928	2.67	2.30	7.06	6.63	5.28	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.69	4.61	5.72
1930	2.47	1.81	4.78	4.96	4.15	3.79	4.58
1931	2.34	1.46	3.10	3.95	3.33	2.11	.46
1932	1.87	1.04	2.18	2.18	1.82	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.58	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.84	2.67	3.27
1935	1.47	1.15	4.59	3.10	2.65	3.06	3.65
1936	1.53	1.23	4.17	3.42	2.67	3.58	4.25
1937	1.63	1.32	4.91	4.66	3.65	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.17	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.12	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.35	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.27	3.76	4.43
1942	1.74	1.41	6.11	5.77	3.34	5.04	6.76
1943	1.75	1.42	6.30	5.77	3.34	4.86	6.62
1944	1.75	1.42	7.68	5.77	3.34	4.86	6.71
October	1.75	1.42	7.81	5.77	3.34	4.86	6.71
November	1.75	1.42	7.81	5.77	3.34	4.86	6.71
December	1.75	1.42	7.81	5.77	3.34	4.86	6.71
1945							
January	1.75	1.42	7.81	5.77	3.34	4.86	6.71
February	1.75	1.42	7.81	5.77	3.34	4.86	6.71
March	1.75	1.42	7.81	5.77	3.34	4.86	6.71
April	1.75	1.42	7.81	5.77	3.34	4.86	6.71
May	1.75	1.42	7.81	5.77	3.34	4.86	6.71
June	1.75	1.42	7.81	5.77	3.34	4.86	6.71
July	1.75	1.42	7.81	5.77	3.34	4.86	6.71
August	1.75	1.42	7.81	5.77	3.34	4.86	6.71
September	1.75	1.42	7.81	5.77	3.34	4.86	6.71
October	1.75	1.42	7.81	5.77	3.34	4.86	6.71
Index Numbers (1910-14 = 100)							
1922	113	90	173	132	117	140	142
1923	112	102	177	137	140	136	147
1924	111	86	168	142	145	107	121
1925	115	87	155	151	155	117	135
1926	113	84	126	140	146	129	139
1927	112	79	145	166	143	128	162
1938	100	81	202	188	173	146	170
1929	96	72	161	142	154	137	162
1930	92	64	137	141	136	12	130
1931	88	51	89	112	109	63	70
1932	71	36	62	62	60	36	39
1933	59	39	84	81	85	97	71
1934	59	42	127	89	93	79	93
1935	57	40	131	88	87	91	104
1936	59	43	119	97	89	106	131
1937	61	46	140	132	120	120	122
1938	63	48	105	106	104	93	100
1939	63	47	115	125	102	115	111
1940	63	48	133	124	110	99	96
1941	63	49	157	151	107	112	126
1942	65	49	175	163	110	150	192
1943	65	50	180	163	110	144	189
1944	65	50	219	163	110	144	191
October	65	50	223	163	110	144	191
November	65	50	223	163	110	144	191
December	65	50	223	163	110	144	191
1945							
January	65	50	223	163	110	144	191
February	65	50	223	163	110	144	191
March	65	50	223	163	110	144	191
April	65	50	223	163	110	144	191
May	65	50	223	163	110	144	191
June	65	50	223	163	110	144	191
July	65	50	223	163	110	144	191
August	65	50	223	163	110	144	191
September	65	50	223	163	110	144	191
October	65	50	223	163	110	144	191

Wholesale Prices of Phosphates and Potash**

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Kainit, 20% bulk, per unit, c.i.f. Atlantic and Gulf ports
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657	$0.655
1922	.566	3.12	6.90	.632	.904	23.87	....	.508
1923	.550	3.08	7.50	.588	.836	23.32	....	.474
1924	.502	2.31	6.60	.582	.860	23.72	....	.472
1925	.600	2.44	6.16	.584	.860	23.72	....	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537	.524
1927	.525	3.09	5.50	.646	.924	25.55	.586	.581
1928	.580	3.12	5.50	.669	.957	26.46	.607	.602
1929	.609	3.18	5.50	.672	.962	26.59	.610	.605
1930	.542	3.18	5.50	.681	.973	26.92	.618	.612
1931	.485	3.18	5.50	.681	.973	26.92	.618	.612
1932	.458	3.18	5.50	.681	.963	26.90	.618	.591
1933	.434	3.11	5.50	.662	.864	25.10	.601	.565
1934	.487	3.14	5.67	.486	.751	22.49	.483	.471
1935	.492	3.30	5.69	.415	.684	21.44	.444	.488
1936	.476	1.85	5.50	.464	.708	22.94	.505	.560
1937	.510	1.85	5.50	.508	.757	24.70	.556	.607
1938	.492	1.85	5.50	.523	.774	15.17	.572	.623
1939	.478	1.90	5.50	.521	.751	24.52	.570	.670
1940	.516	1.90	5.50	.517	.730	24.75	.573	....
1941	.547	1.94	5.64	.522	.780	25.55	.570	....
1942	.600	2.13	6.29	.522	.810	25.74	.205	....
1943	.631	2.00	5.93	.522	.786	25.35	.195	....
1944	.645	2.10	6.10	.522	.777	25.35	.195	....
October	.650	2.20	6.10	.535	.797	26.00	.200	....
November	.650	2.20	6.10	.535	.797	26.00	.200	....
December	.650	2.20	6.10	.535	.797	26.00	.200	....
1945								
January	.650	2.20	6.10	.535	.797	26.00	.200	....
February	.650	2.20	6.13	.535	.797	26.00	.200	....
March	.650	2.20	6.20	.535	.797	26.00	.200	....
April	.650	2.20	6.20	.535	.797	26.00	.200	....
May	.650	2.20	6.20	.535	.797	26.00	.200	....
June	.650	2.20	6.20	.471	.701	22.88	.176	....
July	.650	2.20	6.20	.503	.749	24.44	.188	....
August	.650	2.20	6.20	.503	.749	24.44	.188	....
September	.650	2.20	6.20	.503	.749	24.44	.188	....
October	.650	2.20	6.28	.535	.797	26.00	.200	....
Index Numbers (1910-14 = 100)								
1922	106	87	141	89	95	99	....	78
1923	103	85	154	82	88	96	....	72
1924	94	64	135	82	90	98	....	72
1925	110	68	126	82	90	98	....	74
1926	112	88	114	83	90	98	82	80
1927	100	86	113	90	97	106	89	89
1928	108	86	113	94	100	109	92	92
1929	114	88	113	94	101	110	93	92
1930	101	88	113	95	102	111	94	93
1931	90	88	113	95	102	111	94	93
1932	85	88	113	95	101	111	94	90
1933	81	86	113	93	91	104	91	86
1934	91	87	110	68	79	93	74	72
1935	92	91	117	58	72	89	68	75
1936	89	51	113	65	74	95	77	85
1937	95	51	113	71	79	102	85	93
1938	92	51	113	73	81	104	87	95
1939	89	53	113	73	79	101	87	93
1940	96	53	113	72	77	102	87	....
1941	102	54	110	73	82	106	87	....
1942	112	59	129	73	85	106	84	....
1943	117	55	121	73	82	105	83	....
1944	120	58	125	73	82	105	83	....
October	121	61	125	75	84	108	83	....
November	121	61	125	75	84	108	83	....
December	121	61	125	75	84	108	83	....
1945								
January	121	61	125	75	84	108	83	....
February	121	61	126	75	84	108	83	....
March	121	61	127	75	84	108	83	....
April	121	61	127	75	84	108	83	....
May	121	61	127	75	84	108	83	....
June	121	61	127	66	74	95	80	....
July	121	61	127	70	79	101	82	....
August	121	61	127	70	79	101	82	....
September	121	61	127	70	79	101	82	....
October	121	61	129	75	84	108	83	....

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer materials‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash
1922.....	132	149	141	116	101	145	106	85
1923.....	143	152	147	114	107	144	103	79
1924.....	143	152	143	103	97	125	94	79
1925.....	156	156	151	112	100	131	109	80
1926.....	146	155	146	119	94	135	112	86
1927.....	142	153	139	116	89	150	100	94
1928.....	151	155	141	121	87	177	108	97
1929.....	149	154	139	114	79	146	114	97
1930.....	128	146	126	105	72	131	101	99
1931.....	90	126	107	83	62	83	90	99
1932.....	68	108	95	71	46	48	85	99
1933.....	72	108	96	70	45	71	81	95
1934.....	90	122	109	72	47	90	91	72
1935.....	109	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	122	131	126	81	50	129	95	75
1938.....	97	123	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	124	131	127	86	56	130	102	77
1942.....	159	152	144	93	57	161	112	77
1943.....	192	167	150	94	57	160	117	77
1944.....	195	176	151	96	57	174	120	76
October...	194	176	152	97	57	175	121	78
November.	196	177	152	97	57	175	121	78
December..	200	178	152	97	57	175	121	78
1945								
January...	201	179	153	97	57	175	121	78
February..	199	179	153	97	57	175	121	78
March.....	198	180	153	97	57	175	121	78
April.....	203	180	154	97	57	175	121	78
May.....	200	180	154	97	57	175	121	78
June.....	206	180	155	95	57	175	121	69
July.....	206	180	154	96	57	175	121	74
August....	204	180	154	96	57	175	121	74
September.	197	181	153	96	57	175	121	74
October...	199	182	154	97	57	175	121	78

* U. S. D. A. figures.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning with June 1941, manure salts prices are F. O. B. mines, the only basis now quoted.

**** The annual average of potash prices is higher than the weighted average of prices actually paid because since 1926 better than 90% of the potash used in agriculture has been contracted for during the discount period. From 1937 on, the maximum seasonal discount has been 12%.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Fruiting and Physiological Responses of Marsh Grapefruit Trees to Fertilization," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., T. Bull. 105, Jan. 1945, A. H. Finch and W. T. McGeorge.

"Commercial Fertilizer Sales as Reported to Date for the Quarter Ended June 30, 1945," Dept. of Agr., Sacramento 14, Calif., FM-112, Sept. 5, 1945.

"Agricultural Mineral Sales as Reported to Date for Quarter Ended June 30, 1945," Dept. of Agr., Sacramento 14, Calif., FM-113, Sept. 5, 1945.

"Soil Fertility Practices for Cotton Production: Gary Field, Money, Mississippi," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 381, Dec. 1944, John Pitner.

"Commercial Nitrogen and Winter Legumes for Cotton Production: Heathman Field," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 382, Dec. 1944, John Pitner.

"Ordinary and Deep Application of Fertilizer for Corn, Delta Station, 1942-1944," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 383, Jan. 1945, John Pitner.

"Commercial Fertilizers and Winter Legumes for Cotton Production: Schaefer Field, Yazoo City, Mississippi," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 386, Jan. 1945, John Pitner.

"Commercial Nitrogen for Corn, Delta Station, 1921-1944," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 387, Jan. 1945, John Pitner.

"Commercial Nitrogen for Cotton, Delta Station, 1921-1944," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 388, Jan. 1945, John Pitner.

"Increase Oak Yields with Nitrogen," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 392, March 1945, John Pitner.

"Fertilizer for Cotton Following Winter Legumes," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 396, April 1945, John Pitner.

"Sodium Nitrate as a Supplement to Farm Manure and Red Clover," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Bull. 817, March 1945, J. A. Bizzell and E. W. Leland.

"Results of Agronomic Research on the Use of Lime and Fertilizers in Ohio," Dept. of Agron., Agr. Exp. Sta., Wooster, Ohio, Agron. Mimeo. 96, Nov. 1944, R. E. Yoder.

"Tonnage Report July 1, 1944, Through June 30, 1945," Fertilizer Dept., Clemson Agr. College, Clemson, S. C.

"Fertilizer Recommendations for Vermont 1945-1946," Ext. Serv., Burlington, Vt.

"Report of Inspection Work—Commercial Fertilizers and Limes," Dept. of Agr., Charleston, W. Va., Bull. (n.s.) 40, July 31, 1944.

"Rules and Regulations Pertaining to the Sale of Commercial Fertilizer," Dept. of Agr., Charleston, W. Va., Bull. (n.s.) 43, July 1, 1945.

"Use of Commercial Fertilizers in Cotton Production," U.S.D.A., Washington, D. C., Cir. 726, May 1945, J. J. Skinner.

Soils

"Soil Survey—La Porte County, Indiana," U.S.D.A., Washington, D. C., Series 1934, No. 26, Sept. 1944, H. P. Ulrich, W. J. Leighty, A. E. Shearin, and A. T. Wiancko.

"Soils of Minnesota," Agr. Ext. Serv., Univ. of Minn., St. Paul, Minn., Folder 131, June 1945, P. R. McMiller.

"Soil Management on Heavy Clay (Buckshot) Soils," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 394, April 1945, John Pitner.

"The Use of Heavy Minerals in Studies of the Origin and Development of Soils," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Res. Bull. 387, Feb. 1945, J. F. Haseman and C. E. Marshall.

"Mineralogical and Chemical Studies of the Putnam Silt Loam Soil," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Res. Bull. 386, Nov. 1944, E. P. Whiteside and C. E. Marshall.

"Soil Studies for 1944," Agr. Exp. Sta., Univ. of Nebr., Lincoln, Nebr., E. Bull. 373, Jan. 1945, J. W. Fitts.

"Lime for Oklahoma Soils," Okla. A. & M. College, Stillwater, Okla., Cir. 408, 1945, Wesley Chaffin.

"Conservation and Land Use Investigations," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Mimeo. Cir. M-139, May 1945, H. A. Daniel, H. M. Elwell, and M. B. Cox.

Crops

"Fifty-fifth Annual Report for the Year Ending June 30, 1944," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz.

"Suggestions on How to Top More Onions," Agr. Exp. Sta., Colo. A. & M. College, Fort Collins, Colo., Press Bull. 100, Sept. 1945, J. L. Paschal and R. W. Roskelley.

"1944 Annual Report," Ga. Agr. Ext. Serv., Univ. System of Ga., Athens, Ga., Bull. 515, Feb. 1945.

"4-H Club Manual—Vegetables," Ga. Agr. Ext. Serv., Univ. System of Ga., Athens, Ga., Bull. 516, May 1945, Elmo Ragsdale.

"Pearl Harbor—A Tomato Variety Resistant to Spotted Wilt in Hawaii," Agr. Exp. Sta., Univ. of Hawaii, Honolulu, T. H., Cir. 24, Aug. 1945, K. Kikuta, J. W. Hendrix, and W. A. Frazier.

"For Big Wheat Yields," Dept. of Agr. Ext., Purdue Univ., Lafayette, Ind., Leaf. 270, 1945.

"Alfalfa in Kansas," Ext. Serv., Manhattan, Kans., Cir. M-51, Dec. 1944, L. E. Willoughby and E. A. Cleavinger.

"Brome Grass in Kansas," Ext. Serv., Manhattan, Kans., Cir. M-52, Dec. 1944, E. A. Cleavinger and L. E. Willoughby.

"Home Fruit Production," Ext. Serv., Manhattan, Kans., M. Cir. 34 (Rev.) March 1945, William G. Amstein.

"Fifty-seventh Annual Report," Agr. Exp. Sta., Univ. of Ky., Lexington, Ky.

"Research in Agriculture," A. R. 1943-1944, Agr. Exp. Sta., Univ. of La., Baton Rouge, La.

"Strawberry Growing in Massachusetts," Ext. Serv., Mass. State College, Amherst, Mass., Leaf. 29, Rev. April 1945, A. P. French.

"Currant and Gooseberry Growing in Massachusetts," Mass. State College, Amherst, Mass., Sp. Cir. 121, March 1945, A. P. French.

"Cotton Variety Tests in the Yazoo-Mississippi Delta," Agr. Exp. Sta., Miss. State College, State College, Miss., Bull. 416, April 1945, J. W. Neely and S. G. Brain.

"Tomato Variety Test, Delta Station, 1943-44," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 385, Jan. 1945, L. R. Farish.

"Methods of Planting Soybeans: Delta Station," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 389, Feb. 1945.

"Peach Variety Studies, 1944," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 390, March 1945, L. R. Farish.

"When Should Bur Clover Be Turned Under? Delta Station, 1939-44," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 391, March 1945.

"Summer Legumes and Corn Production: Delta Station, 1944," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 393, March 1945, John Pitner.

"Winter Legumes for Cotton Production," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 395, April 1945, John Pitner.

"Soybean Variety Tests in the Yazoo-Mississippi Delta, 1944," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 397, April 1945.

"Report of Crop and Pasture Experiments at Lathrop in Northwestern Missouri; 1940-1944," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Bull. 486, April 1945, E. M. Brown and C. A. Helm.

"The Production of Quality in Missouri Soft Wheat," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Bull. 487, May 1945, J. M. Poehlman and Ferne Bowman.

"Soybean Seed Production in Missouri," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Cir. 300, May 1945, B. M. King.

"Growing Fall Potatoes," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Cir. 301, June 1945, S. H. Wittwer and Aubrey D. Hibbard.

"The Scottsbluff Pinto Bean," Agr. Exp. Sta., Univ. of Nebr., Lincoln, Nebr., Cir. 78, Dec. 1944, James H. Jensen.

"Grass and Legumes for Land and Livestock," Ext. Serv., Univ. of Nebr., Lincoln, Nebr., C. Cir. 82, Jan. 1945.

"Pasture-Forage-Livestock 1945," Ext. Serv., Univ. of Nebr., Lincoln, Nebr., Cir. 84.

"Four Evergreens for Nebraska," Ext. Serv., Univ. of Nebr., Lincoln, Nebr., Cir. 1725 (1945).

"Cotton Variety Tests in the Rio Grande Valley of New Mexico 1940-1943," Agr. Exp. Sta., State College, N. M., State College of A. & M., N. M., Bull. 319, Dec. 1944, A. R. Leding and L. R. Lytton.

"Field Crop Experiments at Las Vegas, New Mexico, 1937-1944," Agr. Exp. Sta., N. M. College of A. & M., State College, N. M., Bull. 321, June 1945, John Carter, Jr.

"Varieties of Vegetables for 1945," Ext. Serv., Cornell Univ., Ithaca, N. Y., Bull. 671, March 1945, Paul Work.

"Peanuts in Oklahoma," Ext. Serv., Okla. A. & M. College, Stillwater, Okla., Cir. 410 (1945), Wesley Chaffin.

"Hybrid Corn in Oklahoma," Ext. Serv., Okla. A. & M. College, Stillwater, Okla., Cir. 411 (1945), Wesley Chaffin.

"Orchard Soil Covers," Ext. Serv., Oreg. State College, Corvallis, Oreg., E. Bull. 650, Feb. 1945, O. T. McWhorter, E. R. Jackman, and Arthur King.

"Growing Cannery Beets," Ext. Serv., Oreg. State College, Corvallis, Oreg., Cir. 463 (Rev. of E. Cir. 345), Aug. 1945, A. G. B. Bouquet.

"Report of the Federal Experiment Station in Puerto Rico 1944," U.S.D.A., Washington, D. C.

"Lespedeza," Clemson Agr. College, Clemson, S. C., Cir. 271, June 1945, W. H. Craven.

"South Dakota Corn Performance Test, 1944," Agr. Exp. Sta., S. D. State College, Brookings, S. D., Cir. 55, Jan. 1945, Karl F. Manke and J. E. Grafius.

"Research Serves Agriculture, 57th A.R.," Agr. Exp. Sta., A. & M. College of Texas, College Station, Texas.

"Two New Strains of Virginia Type Pea-

nuts," Agr. Exp. Sta., Blacksburg, Va., Bull. 370, July 1945, E. T. Batten.

"Alfalfa in Eastern Washington," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Bull. 462, May 1945, E. J. Kreizinger and Alvin G. Law.

"Grazing on the Cutover Lands of Western Washington," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Pop. Bull. 179, June 1945, T. W. Daniel and M. E. Ensminger.

"Safeguarding New Seedings," Ext. Serv., College of Agr., Univ. of Wis., Madison, Wis., Cir. 300, April 1940, H. L. Ahlgren and L. F. Graber. (Rev. March 1945.)

"Young Farm Orchards in Wisconsin," Ext. Serv., Univ. of Wis., Madison, Wis., Stencil Cir. 242, March 1945, Conrad L. Kuehner.

"Soft Corn," Ext. Serv., Univ. of Wis., Madison, Wis., Sp. Cir., Aug. 1945.

"Alfalfa Varieties in the United States," U.S.D.A., Washington, D. C., F.B. 1731, Rev. Aug. 1945, H. L. Westover.

Economics

¶ Data on New Jersey agriculture from almost every conceivable angle have been compiled and presented in New Jersey State Department of Agriculture Circular 339 entitled, "New Jersey Agriculture, Historical Facts and Figures." This large volume is the work of D. T. Pitt and L. P. Hoagland. In addition to the great mass of statistical data, climatic and soil zones of the State are described, principal soil groups are briefly discussed, and historical facts on New Jersey agriculture are presented.

"Statistical Information Pertaining to the Marketing of Agricultural Products in Connecticut 1944," Dept. of Agr., State Office Bldg., Hartford, Conn.

"Hogging-Off Crops in the Coastal Plain," Coastal Plain Exp. Sta., Univ. System of Ga., Tifton, Ga., Bull. 41, Feb. 1945, B. L. Southwell and Kenneth Treanor.

"Production Adjustment Study of Illinois Agriculture," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., AE2331, July 16, 1945.

"Low-Cost Labor, Power, and Machinery Set-Ups for Indiana Farms," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., Bul. 502, Feb. 1944, J. C. Bottum.

"Postwar Planning at the Community Level," Agr. Exp. Sta., Kansas State College of Agr., Manhattan, Kansas, Cir. 225, Aug. 1944, W. E. Grimes.

"The Trend of Real Estate Taxation in Kansas, 1910 to 1942," Agr. Exp. Sta., Kansas State College of Agr., Manhattan, Kansas, Cir. 228, Oct. 1944, Harold Howe.

"Inter-Relationships Among Farms in a Community," Agr. Exp. Sta., Manhattan, Kans., Cir. 229, May 1945, M. L. Otto.

"Kansas Rural Institutions: I. The Fort Hays Branch Experiment Station," Agr. Exp. Sta., Manhattan, Kans., Cir. 231, May 1945, F. D. Farrell.

"Maryland Agriculture in the Post-War Period," Ext. Serv., Univ. of Md., College Park, Md.

"Annual Crop and Livestock Summary," Mich. Dept. of Agr., Lansing, Mich.

"Mechanization of the Cotton Harvest," Agr. Exp. Sta., Miss. State College, State College, Miss., Bull. 420, June 1945, Frank J. Welch and D. Gray Miley.

"Developments in Mechanization in 1944," Agr. Exp. Sta., Miss. State College, State College, Miss., S.S. 384, Jan. 1945, P. W. Gull, T. L. Baggette, and J. E. Adams.

"The Agricultural Outlook for Missouri, 1945," Agr. Exp. Serv., Univ. of Mo., Columbia, Mo., Manual 37, April 1945, Gordon B. Nance.

"Income, Expenses and Savings of Local Cooperative Associations," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Res. Bull. 389, March 1945, Herman M. Haag.

"Corn," State Dept. of Resources & Dev., Jefferson City, Mo.

"Montana's Agriculture," Ext. Serv., Mont. State College, Boseman, Mont., Bull. 228, May 1945, H. G. Bolster and H. R. Stucky.

"Nebraska Wartime Food Production," Ext. Serv., Univ. of Nebr., Lincoln, Nebr., 1944 A. R.

"Shall I Buy a Farm?" Agr. Exp. Sta., Rutgers Univ., New Brunswick, N. J., Bul. 719, June 1945.

"Average Prices Received and Prices Paid by New Jersey Farmers, 1910-1943," Dept. of Agr., Trenton, N. J., Cir. 351, June 1944.

"Retailing Potatoes and Other Vegetables, Buffalo, New York, 1940," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y. Bul. 814, Jan. 1945, Wayne A. Lee.

"Production Adjustments in Oklahoma Agriculture for 1945," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Mimeo. Cir. M-131, Sept. 1944.

"Mechanical Harvesting of Cotton," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Bull. 286, Aug. 1945, Henry Dunlavy and I. M. Parrott.

"Farm Opportunities in Washington County, Oregon, 1945," Ext. Serv., Oreg. State College, Corvallis, Oreg., Bull. 653, March 1945.

"Oregon's Grain and Hay Crops 1869-1944," Ext. Serv., Oreg. State College, Corvallis, Oreg., Bull. 654, April 1945.

"Oregon's Small Fruit Crops 1936-1944," Ext. Serv., Oreg. State College, Corvallis, Oreg., Bull. 656, May 1945.

"A Pattern of Agricultural Production in S. C. After the War," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Bull. 356, April 1945, M. J. Peterson and G. H. Aull.

"Getting Started Farming after the War," Agr. Ext. Serv., Univ. of Tenn., Knoxville, Tenn., Publ. 290, June 1945, J. L. Anderson and E. P. Callahan.

"Do You Want a Jalopy Farm?" Agr. Ext. Serv., Univ. of Tenn., Knoxville, Tenn., Leaf. 81, July 1945, F. J. Walrath.

"Prospective Farming on the Columbia Basin Irrigation Project," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Bull. 456, Jan. 1945, B. H. Pubols.

"Final Report of the War Food Administrator 1945," U.S.D.A., Washington, D. C.

"South Carolina Forest Growth and Drain 1936-1943," U.S.D.A., Washington, D. C., Forest Survey Release 20, June 1945, Thos. Lotti and A. S. Todd, Jr.

"Wheat Production in War and Peace," U.S.D.A., Washington, D. C., F.M. 48, May 1945, C. P. Heisig, E. R. Ahrendes, and D. E. Merrick.

"Marketing and Manufacturing Margins for Textiles," U.S.D.A., Washington, D. C., T. Bul. 891, March 1945, L. D. Howell.

"The Place of Cooperatives in the Fertilizer Industry," U.S.D.A., Washington, D. C., Misc. Report 85, May 1945, Joseph G. Knapp.

Co-operate With Latin America

Scientific experimentation is now on a hemispheric basis to develop supplies which the United States needs but does not produce. Cooperative agreements between the U. S. Department of Agriculture and the Governments of Costa Rica, Ecuador, El Salvador, Nicaragua, and Peru have resulted in establishment of cooperative experiment stations to stimulate the production of those complementary commodities which the U. S. needs but does not grow. Scientific specialists are experimenting both here and in Latin America.

The work includes agronomic investigations, demonstration, extension teaching, and the selection and multiplication of superior plant-propagating material. The scientists are striving to encourage production of quinine, rubber, insecticidal plants, tea, and rope fibers as the more important commodities. Many of these products grow best in the tropics and should do well in Latin American countries. Work with hevea or plantation rubber plants and cinchona, the source of quinine, has been under way at the Peruvian station at Tingo Maria for several years.

Rotenone investigations have progressed well since cuttings of derris plants became available from the U. S. Department of Agriculture experiment station in Mayaguez, P. R. Work is also being done in botany, soil conservation, and land use. Extension teaching is improving living standards.

Soybean Is the Glamour Crop

Until rather recently the soybean was a stranger to our agricultural economy, Secretary of Agriculture Anderson commented recently. "Now, however, it has become the glamour crop of agriculture. Not only does soybean oil comprise about 13 per cent of our total production of fats and oils—including butter and lard—but soybean meal has been the largest single protein concentrate for hogs, beef and dairy cattle, and poultry. It was responsible in a large degree for the great wartime increase in production of meat, eggs, and milk.

"Because increases in soybean acreage to meet wartime needs were so great, producers will face the problem of adjusting their greatly expanded production to a peacetime level. But increased uses of many soybean products have become so firmly established that a post-war peacetime level of production will not be the same thing as the pre-war peacetime level of production."

Borax on Crimson Clover in Tennessee

(*From page* 26)

applied, and 45 per cent reported no increase in growth.

Some of those who reported no increase in growth reported a greener color in areas where borax was applied.

Weakley County is cited as an example where 12 reports were obtained by County Agent Walker from the 16 demonstrations he established in the fall of 1944. Four reports show a decided increase in the stand; eight indicate little or no benefit to stand; seven show noticeable increase in growth; and five report little or none.

Many demonstrators throughout the State applied the borax at time of seeding, which may account for many of the demonstrations showing no benefit to the stand.

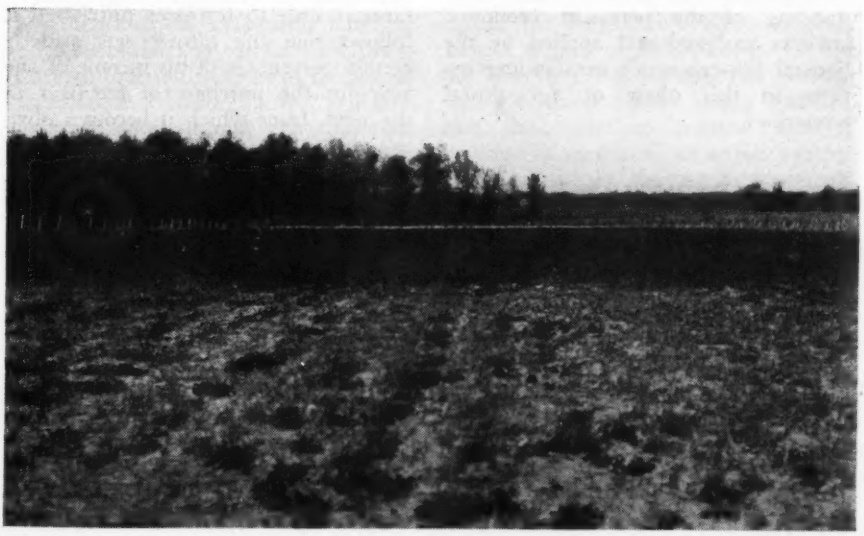
A satisfactory measurement of the increase in seed yield was not made. Due to the extremely rainy season in seed harvest in 1945, it was hardly practical to secure weights of seed from the combine since combining was necessary between showers.

Conclusions

From the observations and reports on the effect of borax on crimson clover in Tennessee, it is evident that there are conditions in the State where applications of borax should be made prior to seeding crimson clover. Under many soil conditions unfavorable to crimson clover it is apparent that borax will increase the stand that may be obtained, increase the winter survival, and increase the growth.

It has been observed that this is most likely to occur on land that is thin or that has a tendency to be drouthy, and on land that has poor under-drainage and aeration. Each of these general types of soils is relatively infertile and cannot be described as land best adapted to crimson clover; however, such types of land are in great need of improvement through the use of winter legumes.

On soils that contain more organic matter, that are well-drained, and at



Demonstration with the use of borax on crimson clover in Lawrence County. The foreground received no borax; the background, 25 pounds per acre. The crimson clover in the foreground died in December following seeding in August.

the same time are satisfactory from a moisture-holding standpoint, benefits from the use of borax have been negligible or at least uncertain from the standpoint of increased stand and growth. Increased seed yields have been reported in numerous instances on such lands, and the greatest advantages of borax under such conditions may be through earlier ripening of th seed. If borax consistently ripens the seed heads about three days early, as has been observed and reported by county agents, then an application of borax on a portion, about half, of the crimson clover acreage to be harvested for seed may be advisable. This would permit the use of combining equipment on the farm for a three-day longer season, and would tend to spread the risk of obtaining a seed crop during a rainy season to the extent of this period of time.

Indirect beneficial effects have been noted on crops following crimson clover even where the clover itself showed no response. This is worthy of further investigation.

Explanations of occurrences such as this and to our conflicting observations noted in this paper are not to be obtained from demonstrations, but from well-planned and properly executed research where there are not so many unknown variables and where more accurate data can be obtained.

Potash—In War and Peace

(*From page* 23)

consumption of 515,000 tons. These estimates must be accepted as realistic since they are based on a full understanding of the pertinent economic laws as analyzed and applied by the Federal Government's outstanding experts in this phase of agricultural economics.

However, another factor of great importance is emphasized in that report. From the relationship of gross farm income to fertilizer purchased it follows that the farmer sets aside a certain percentage of his income of one year for the purchase of fertilizer in the next, from which it becomes obvi-

ESTIMATED FERTILIZER AND PLANT FOOD THAT WOULD BE PURCHASED BY FARMERS

Item	Full employment	Some unemployment	Considerable unemployment (depression)
Gross farm income, million dollars	16,500	12,000	8,000
Expenditure for fertilizer, million dollars	395	305	210
Average cost of fertilizer, dollars per ton	33	32	30
Fertilizer purchased, 1,000 tons [1]	12,000	9,500	7,000
Plant-food content, 1,000 tons:			
Nitrogen, N	625	495	365
Phosphoric Acid, P_2O_5	1,125	890	655
Potash, K_2O	650	515	380
Total plant food	2,400	1,900	1,400

[1] Assumed composition, 5.2 per cent N, 9.14 per cent P_2O_5, and 5.4 per cent K_2O.

ous that the retail farm price per unit is also a factor in determining how much plant food he can buy with this limited percentage of his income budgeted for that purpose. Agricultural economists, both Federal and State, have long and repeatedly pointed out the well-established fact that the retail farm price per unit plant food is substantially reduced by increasing the plant-food concentration of the mixtures; in other words, the higher the plant-food concentration, per given mixing charge, the lower the retail farm price per unit and the more plant food the farmer can buy per unit of income.

Elaborating this factor, the report referred to points out that plant food contained in an 8-16-16 grade costs only 59% as much as in a 3-6-6 grade. Of the five recommended improvements listed as means of reducing the farm retail price of plant food, two are given the greatest emphasis, namely, a 20 to 30% increase in the average plant-food content of mixed goods and the substitution of high-grade chemical ammoniates for the low-grade organics.

Probable Consumption

With the institution of these improvements in the plant-food retailing and distributing system the conclusion is drawn that with the farm income of $16.5 billion resulting from "full employment," plant-food consumption probably would approximate 750,000 tons of N, 1,220,000 tons P_2O_5, and 790,000 tons of K_2O, equivalent to an increase of 1,800,000 tons of mixed goods or 63% greater than in 1941. To be sure this means the reduction of fillers, the use of which has increased from 6.7% in 1900 to 17.8% in 1941 with the increase in concentration of plant-food materials. It has been noted in foregoing paragraphs that of the various potash salts now available, the 60% K_2O grade of muriate has largely displaced the lower grades formerly in use. With the substitution for burlap of the cheaper moisture-proof paper bags found so efficient in maintaining the highly hygroscopic ammonium nitrate in satisfactory "condition" even after prolonged storage, the elimination of fillers will be greatly facilitated, since their function as "conditioners" will no longer have any value.

Whether these much to be desired improvements with their resulting increases in plant-food consumption will be realized by 1950 remains to be seen. Optimism both as to that realization as likewise our success in maintaining a state of "full employment" impels our consideration also of this theoretical future level of potash consumption.

Here are four possible levels depending on future developments at present unknown, of course, yet clearly defined as to the conditions determining their realization. If we compare our current rate of potash production, the estimated 892,000 tons K_2O previously mentioned, with the projected rates of consumption, we find that even at the maximum rate of 790,000 tons K_2O for United States agriculture we still shall have a reserve of 100,000 tons for the chemical industry and Canadian agriculture, both to be readjusted to a peace-time basis by 1950. In the absence of the distribution reform recited, but still with full employment, calling for 650,000 tons K_2O, we shall have a surplus of 240,000 tons. Without carrying the comparison further the conclusion seems amply justified that the American potash industry, having demonstrated its entire competence to supply the requirements of the farmer with his current gross income of $21 billion, the chemical industry with its demand increased from 16,000 tons prewar to 103,000 tons K_2O, and Canada allocated 45,000 tons as contrasted to 21,000 tons prewar, can now be relied upon with considerable faith to supply the lesser amounts which reason and common sense force us to regard as the probable requirements five years hence. The potash production problem of 1950, instead of the present one of how to produce the last remaining ton of capacity may prove to be that of operating mines and

refineries at a high enough rate of output to represent efficient, low-cost production.

We have no alternative but to accept as sound the economic principle pertinent to fertilizer consumption discussed in the foregoing paragraphs. However, to a disturbing degree that principle carries the seeds of fatalism, as it could be interpreted as meaning that since farm prosperity depends on that of the Nation as a whole, there is nothing that we as an individual industry can do about it, so we might as well "let nature take its course" and do nothing. This reaction, if it exists or develops, should be vigorously condemned, for it would ignore the benefits of the vast volume of educational work being conducted by the great state and federal agricultural agencies teaching the farmers both the principles and the practices of scientific agriculture. In all of their work the efficient use of chemical and organic fertilizers is stressed as essential to crop nutrition and constantly ever-increasing applications are advocated to combat the rapid soil depletion now recognized as taking place everywhere. What other industry, indeed, is so blessed with an army of zealous workers demonstrating the value of its products to its consumers and at public expense? Surely, and the record is clear, these nation-wide efforts of agronomists, horticulturists, soil technologists, conservationists, and agricultural economists are increasing the demand for plant foods and are developing the opportunity for an ever-expanding and increasingly stabilized market for our products so long as they conform to recommendations and represent the best that we can do with improved technology of production and economy of distribution.

This educational program can be effectively augmented by the 50,000 fertilizer salesmen, agents, and dealers who occupy a strategic position as educators in that it is they who "get in the last word," so to speak, when the farmer is placing his order for his season's fertilizer purchase. A great service thus can be rendered, as likewise a great dis-service if what the farmer is "sold" does not fit his requirements. With the rapid introduction of soil tests provided as a state service and their expert interpretation in terms of soil and crop plant-food requirements the time draws near when the fertilizer the farmer buys will carry the plant-food ratio that best fits his needs and will thus yield to him the maximum profits from its use. By this means the results of scientific research and demonstrations will more certainly reach the farmer for whose benefit they are intended.

Effect of Imports

There are those, apparently, who are anticipating the post-war restoration of imports from Europe as making some desirable contribution to our potash problem. In view of our prospective surpluses from our own industry, it is far from clear just how imports are going to improve that situation. Perhaps it has been forgotten that the Nation in 1911 first concerned itself with the establishment of a domestic potash industry, formulating a policy encouraging exploration, technological research and development, for no other reason than to rid ourselves of a state of utter dependence on the German Potash Trust for all of the potash then being used in American agricultural and chemical industries. The telling argument advanced was that the purpose of a monopoly was to exploit the consumer. Subsequently, the German monopoly was succeeded by the European Potash Cartel. The Nation has registered its disapproval of both monopolies and cartels in no uncertain fashion, but whether that disapproval is going to be noticed on the other side of the Atlantic remains to be seen.

Before the restoration of imports is welcomed too enthusiastically, it might be well to consider with some care the nature, policy, and ultimate purposes of the European exporters. The labor employed in our own mines and refin-

eries is being paid at a wage scale unprecedentedly high while from Europe, by contrast, we hear reports of prisoner labor. If domestic employment is essential to the prosperity of the fertilizer industry, the inference is obvious. At any rate, the conclusion seems justified that until a better understanding of European developments is awaited, a wise procedure would be to retain unchanged the Nation's potash policy now adhered to for 34 years under which complete satisfaction has been the result.

Kudzu on Abandoned Land Needs Phosphate and Potash

(*From page* 8)

there will be many acres of good land planted to kudzu. It is too good a crop to be recommended for the poor land only.

Not only are the farmers interested in kudzu. Army, highway, and railroad engineers see the value of and need for erosion control wherever they have to move earth from one place to another and hold it in place. Steep banks, cuts and fills, runoff water, galled and gullied areas have been controlled with kudzu—a good crop.

What Is the Best Method of Applying Fertilizer?

(*From page* 10)

bands about 1½ inches from the seed gave better results than when the fertilizer was applied in the bottom of the furrow. Similar results were secured in Michigan, but in this case the fertilizer placed in bands but ½ inch from the seed gave best results. On the other hand, Dr. Frank App of the Seabrook Farms recommends at least 1,000 lbs. of fertilizer per acre with the suggestion that both the fertilizer and lime should be applied early in the spring before plowing. Seaton of the Continental Can Company advises drilling in the fertilizer 3 to 4 inches deep. Jesse Huffington of Pennsylvania State College sums up the recommendations for applying fertilizer to peas in this manner: "Pea growers in Pennsylvania have found that on soils low in fertility plowing down is probably the best method, but on fertile, well-limed soils fertilizers drilled deeply have come out ahead every time."

The band-placement method, which received so many plaudits a few years ago, is now found not a cure-all nor the one perfect method. Some experts feel that by placing the fertilizer in bands they have eliminated the danger from injury, but Dr. Mahoney of the University of Maryland reports that in 1941 when it was very dry at planting time and for three weeks after there was a heavy loss of plants due to fertilizer toxicity when the fertilizer was applied in bands. With the band method the fertilizer is placed so that the roots can reach it easily and there is less fixation than with some of the other methods, but it should be used cautiously when large amounts of fertilizer are applied per acre. When over 500 lbs. of a fertilizer such as a 5-10-5 or 4-12-4 are applied, Dr. Thompson suggests that the band method should be combined with some other method so as to lessen the danger from injury to the plants or seed. As stated above, many pea growers have found that placing the fertilizer in bands has given the best results. There is, apparently,

more danger when the fertilizer is applied in bands on sandy or sandy loams than when the same method is followed on silt loams, clay loams, or mucks.

Dr. Thompson feels that when as good results are obtained with a small amount of fertilizer applied in bands as when larger amounts are applied in some other method either the rate was low or the soil had a high-fixing capacity for P and K or both, and he contends that in cases where large amounts of fertilizer are needed they are needed regardless of the methods used to apply this fertilizer.

When part of the fertilizer was placed in the furrow and the remainder applied in bands, the results were favorable in more cases than with any other method—in 8 out of 16 tests this method gave the best results. This method is preferred on fairly heavy soils, and the proportion to be placed in the furrow depends on the crop to be grown, methods of cultivation, and soil type. With potatoes in Pennsylvania this method has proved very promising, and reports from other states would seem to indicate that it will apply to more crops and under more different conditions than any other method so far tested.

Results of Drilling in Fertilizer

Drilling in the fertilizer 3 to 4 inches deep has given good results in many cases where several methods have been compared. It has proved best for peas in several states, for corn in New Jersey, for soybeans in several states, and seems the best method when large amounts of fertilizer are applied.

Among the prize-winners in the Pennsylvania Tomato Contest in 1943 in the 3-acre-or-less class, the first three winners drilled in the fertilizer after plowing while in the 7-acre-or-more class two of the winners applied the fertilizer before plowing and one after plowing. Of the 977 growers in the contest, 263 drilled the fertilizer broadcast, 90 broadcast and side-dressed, and 67 applied the fertilizer broadcast and in the row. Thus the broadcast method alone or with some other method was followed by the largest proportion of growers. A yield on 75 acres of 14.86 tons per acre was obtained at the Starky Farms in 1941, the largest yield of tomatoes on such a large acreage. And with this large yield went quality, for this large crop graded 69 per cent No. 1's, 29 per cent No. 2's, and 2 per cent culls. In producing this large yield 200 lbs. of cyanamid were broadcast on cover crop with 1,000 lbs. of a 2-10-10 broadcast, and 150 lbs. of muriate of potash were applied after the plants were set. A starter solution was used and a 97 per cent stand was secured by this method.

Tests with tomatoes at Geneva, New York, in 1943 indicated that the method of applying part of the fertilizer in the furrow and part in bands was the best, but all or 800 lbs. of fertilizer applied in the bottom of the furrow was not as good as the five other methods tried. There was no significant difference between 600 lbs. of fertilizer broadcast and plowed under, 600 lbs. drilled deeply, 200 lbs. in bands, and 600 lbs. in bands. In this test a 5-20-5 analysis was used, but in another test where a 3-12-6 fertilizer was applied, although the combination of placing part of the fertilizer in the bottom of the furrow and the rest in bands gave the best results, there was no significant difference between this method and the one in which 1,200 lbs. of fertilizer were broadcast and plowed under or 1,200 lbs. in the furrow, or 1,200 lbs. disked after plowing. The first test was on Ontario loam and the second on Palmyra stony loam—a pH of 7.2 and 6 respectively.

In other tests with tomatoes, fertilizer drilled 4 inches deep resulted in 1½ tons more per acre than where the fertilizer was broadcast and disked, and the same amount was secured when the fertilizer was plowed under 8 inches deep over broadcast and disked.

In a potato fertilizer test at the Philadelphia County Prison Farm, Torresdale, Pennsylvania, in 1942 on a timothy sod, a 4-12-12 fertilizer at the rate of 1,000 lbs. per acre was applied all in

bands versus three-fourths plowed down with one-fourth in bands. An average of four replications showed a yield of 321 bushels per acre under the band method and 374 bushels with the combination of plowed down and band. Similar field tests in 1943-1944 have further confirmed the advantages of this method of fertilizing.

Although deep applications are quite generally recommended for heavy soils and shallow applications for light soils, it would seem that the combination of applying the fertilizer part in the furrow ½ to 2/3 of the total amount plowed under, and the rest in bands is the best bet to date under all conditions. This practice merits consideration especially for crops such as tomatoes and potatoes which ordinarily use in excess of 800 lbs. of fertilizer per acre. Less likelihood of fertilizer injury at planting time and assured supply of plant food in the lower part of the furrow in periods of suboptimum rainfall give to the practice a high insurance value.

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First Things First in Soil Fertility

(*From page* 16)

phosphate, nevertheless in the Illinois system, data reveal that a dollar expended for superphosphate has given approximately the same returns as a dollar invested in rock phosphate. Therefore, superphosphate is recommended as an effective and economical source of phosphorus. However, when measured in sufficiency and permanency, the rock phosphate has thus far proved superior. The cheapness of the rock phosphate per pound of material and per unit of plant food has encouraged much larger applications which in turn come nearer to sufficiency rations and offer a greater degree of permanency.

Mixed fertilizers now bidding for a place as soil-builders offer a source of phosphorus and other plant-food elements, mainly nitrogen and potassium. First we ask ourselves: Can this source of plant food replace to any particular extent those sources already recommended? Measured by one yardstick the more commonly sold fertilizers, like 2-12-6, cannot compete in price or sufficiency. To supply the 150 pounds of nitrogen used by the corn plants in the production of 100 bushels of corn, 3.75 tons of 2-12-6 would have to be used at a cost of $123. Even if $45 were subtracted for the phosphorus and potassium added in the fertilizer the nitrogen would still cost $78, far too much for a profitable investment. Contrasted with this, an equivalent amount of nitrogen can be added to the soil through legumes for less than $5. Other commercial materials supplying only nitrogen could be used at a cost of only $15. Besides showing the impracticability of using a fertilizer like 2-12-6 for soil building, the financial analysis also discloses the out-of-proportion ratio of the grade when used for corn. While supplying the 150 pounds of nitrogen for a single 100-bushel corn crop, the 3.75 tons of 2-12-6 would supply 900 pounds of phosphoric acid, sufficient for 16 one-hundred-bushel crops, and 450 pounds of potash also sufficient for four such crops.

While it is evident that most complete mixed fertilizer grades now on the market cannot be conscientiously

recommended for Corn Belt crops, in quantities adequate to build up and maintain the fertility of depleted soils, they may be used as effective supplements. In fact requirements for their use should be written into a rational soil fertility program as another step in assuring maximum production of high quality products.

Fertilizers as Appetizers

In a supplementary role, fertilizers act as appetizers. When relatively small and inexpensive applications of quickly available plant food are concentrated in a small area by or with the seed at planting time, they stimulate rapid early growth of both the root system and stalk. This stimulation and concentrated available food supply aid the plant in bridging over adverse conditions or external obstructions. Some insect damage on the roots of corn can be largely controlled by this type of fertilization. Retarded growth in cold, wet springs can be prevented. The ill effects of late plantings can be lessened. Cultivation and weed control are made easier. When corn planting is delayed to avoid first-brood corn-borer damage, supplementary fertilization may hasten maturity to a stage that will decrease the loss from second-brood larvae. Where obstacles are effectively overcome, there may be an improvement in quality over and above that expected from the amount of plant food supplied.

To the credit of mixed fertilizer is certainly this fact—when an adapted grade is used at a rate in accordance with requirements and feasibility, it supplies the plant food for the yield increase which it produces.

When using fertilizers of any kind in small applications for stimulating or appetizing effects it is well to have a thorough understanding of what may be taking place. Increased yields resulting from deficiency applications are likely to create a wrong impression. On the surface such results indicate that soil fertility is being maintained or increased. This notion is a serious disillusionment and if the practice is maintained for any length of time it will lead to uneconomical production and disaster.

Then, too, there is a chance that yields may be reduced by the use of improperly balanced fertilizers on poor soils. An outstanding example of this occurred at Lebanon Experiment Field a number of years ago where a hill-drop application of 125 pounds of 2-12-6 reduced the yield of corn 40 bushels below that of untreated land. When sufficient nitrogen was added at the last cultivation of the crop, the 40-bushel deficit was erased and an 11-bushel increase was produced for the same treatment over the untreated strip. Many other less striking examples of this effect could be cited. Early stimulation of corn growth by small applications of improperly balanced high-phosphate fertilizers on soil that is likely to run short of water and nitrogen in midseason is quite likely to prove disastrous and certainly unprofitable. These experiences confirm our fertilizer recommendations when we say "do not try to increase corn yields by applying small amounts of quickly available fertilizers on soil known to be low in organic matter and nitrogen." Limestone, legumes, organic matter, and an abundance of nitrogen are needed as a first and as a "must" preceding hill applications.

Recent intensive publicity given to the so-called "plow-sole," preferably plow furrow, method of fertilizer application has been effective in calling attention again and in another way to the fact that old, worn-out, unproductive soils will respond to treatment, and that it takes relatively large applications of plant food to restore virgin fertility.

The plow-furrow method, which has not yet been proved sufficiently to warrant its being widely recommended in Illinois, is an easy way of applying fertilizers down deep in the soil. This placement has the advantage of less fixation, more certain contact with moist soil, and root attraction to deeper soil layers.

Corn after alfalfa sod where starter fertilizer (3-12-12) in the hill at planting time helped push corn away from insect damage. Carthage, Illinois, Soil Experiment Field, 1943. Yield on left, 77 bushels; on right, 93 bushels.

The method has proved most attractive where it was desirable to make heavy applications of soluble fertilizer for high profit crops. For general farm crops, particularly corn, it may prove effective in supplying supplementary chemical nitrogen or high-nitrogen fertilizers where legumes have failed or where they were not the preceding crop. Also, it may be a practical way of applying potash for soybeans on land exceedingly low in that nutrient.

Summary

Probably a few points should be emphasized by summarizing them briefly.

1. Maintenance of soil fertility and high productiveness are essential to the welfare of our country and should be more universally and enthusiastically promoted.

2. A scientifically sound, economic, and workable plan of procedure has been discovered and demonstrated. Its use should be more widely and loudly acclaimed.

3. Any plan of soil improvement to be continuously and universally effective must measure up to the yardstick of economy, sufficiency, and permanency.

4. Mixed commercial fertilizers are effective and essential in supplementary roles. They may be used in the conventional or plow-furrow methods of application, depending on the specific situation at hand.

Farmers' Forums

(*From page* 5)

use the axe, the chisel, and the hammer. I have seen too many cases where a farmers' amateur quartet or musical organization was browbeaten by union bosses. I have seen this happen where civic auditoriums were manned by union labor who refused to turn a hand unless the extra set of sharps and flats wearing the union label were sitting in the wings when the hayshakers played their mouth-organs. And when the program was scheduled for the airways,

it might even be necessary to pay two union bands to be quiet long enough for the ruralites to rhythm.

So I ask, who's the boss anyhow when farmers meet—Ed O'Neal and Fred Goss or Mister Petrillo? No candy bars given for the right answer! What's the use of teaching music in rural schools if we have to pay tribute to city slickers everytime we toot and fiddle? Have you ever seen any congressman from the back country rise up on his haunches to launch a bill in favor of fair play for our home-made music? So all the poor yokel can do is to follow Disney's advice and "whistle while you work." And maybe we'll have to hire a union warbler to hang around the farmstead even for that.

THE above is a fair sample of the impromptu diatribes in rural forums of yore, which were studiously shunned by radio reporting and frowned upon advisedly by the academic faculty. Seated up front at the old rickety pine table under the rostrum edge where drops from the water pitcher and oratorical brows kept us well humidified, we all craved a reporter's chance to quote the best of such spasmodic gems. It was all simon-pure native eloquence, even if not as strong on grammar as it was on gestures and gusto.

Only once in my memory did a college don add any off-color flavor of a super-heated kind to a rural conclave. It was back in the times when rival creamery federations sought members across state lines. This professor of marketing was too full of missionary zeal and bigotry on the interstate side, and he met with a provincially centered creamery group who refused to concede that better butter than theirs could be secured by any large overhead control system, so the fur flew faster than buttermilk in a dash churn. To make a long story less painful, during the sort of communion service they had to compare local samples with federated brands, the worthy professor found it necessary to jab a chunk of butter into the whiskers of a stubborn standpatter. The motion pictures missed a good shot, but the professor missed a lot more before the incident closed.

However, such extreme violence was rare enough to make the reporters' table fairly safe. The audience thought too much of their egg money to throw it away on unpopular speakers, so we had little to dodge except speech spatter.

I note that when farmers' organizations meet to stage a real show that will get into the limelight, it is apt to take on a radical flavor. Why not, because if they mooned along with humdrum talks on better sauerkraut barrels, ways to castrate pigs, and the straw loft hennery, nobody would heed them or recognize them as a voice crying in the wilderness to save the nation.

Every day you see circulars from the colleges and agricultural departments showing farmers how to discuss. Just "how to discuss." Of course sometimes these circulars outline both sides or all three sides of the argument and suggest that the county agent be chairman of the convention. But the minute any geezer with wild-flower ideas of his own gathered up at the headwaters of the creek clambers on the rostrum and divests himself of "wrongful" innuendos or bold and brazen irrelevancies, he is ushered into the dog house reserved for dissenters and malcontents. I wonder how far the old elders would have gotten had they been circumscribed and limited in preaching a loud and lurid sort of salvation? Although it may have been dreadful to hear, the listener might better take it and use what he could of it than to stay away from the camp-meeting and risk seeing the real thing a few years later. It's much the same way with these modern farm-meeting rebellions. Instead of cussing out the spokesmen and the ringleaders and yelling how darn radical they are, it might pay to absorb a few drops of their tincture and assist a little in certain reforms that somebody else thought of first. Just because you think you are sober and refuse to see snakes and scorpions crawling over the scenery, it

might be smart to take a little dose of snake medicine anyhow.

The only kind of farm meeting I used to avoid, as far as being down front, was the old style institute where everybody was cordially invited to tote in specimens of fowl (foul) maladies and pig intestinal disturbances. Being averse to quoting Latin or Greek nomenclature, and having a terrible aversion to bacteria from any source, I took a seat rearward but not windward. Here was one instance, at least, where the research man and the able extension agent earned his money. With sleeves rolled to the elbow, and with gestures as deft as Blackstone the magician, these zealous workers in behalf of a pure and unsullied livestock world diagnosed as long as the nose could stand it. Sometimes a little longer.

It was a great boon to mankind and reporters in particular when some college gent invented the lantern slide system of exhibiting animals far gone with everything. More folks could see it all from where they sat and not have to come close to inspect.

WELL, I see I have not got around to discuss Robert's Rules of Order after all. As I know so little about presiding and delaying procedure, my essay on that topic would have been illuminating and convincing.

My only hope is that as farm youth get educated and rigidly schooled in technique at meetings they will not fold up their imagination and quash their originality and convictions—even at the risk of breaking a routine rule. For by and large, the only original thinkers we have left are the ones who live out beyond the suburbs—providing they do not imbibe too much canned radio logic. To them I entrust the delicate job of keeping alive the spark of speechmaking of the kind that somebody listens to because they want to, not because they wish to be polite.

And with the same to you elders who have been with me through all the spells of spellbinding and come out of it eager for more, I end this essay.

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● MILLIONS of years ago, prehistoric forests gathered Nitrogen as they grew. Today this Nitrogen is recovered from coal by modern coke and gas plants as Sulphate of Ammonia. The manufacture of coke-oven *Domestic* Sulphate of Ammonia and its use as a plantfood are graphically portrayed in the 16 mm. sound and color motion picture "Plant Food from Coal," running time 39 minutes. This film is loaned free for educational use. Send your request to the address below. Specifiy dates and alternate dates film is desired.

COKE OVEN AMMONIA RESEARCH BUREAU

50 West Broad Street, Columbus 15, Ohio

Free! **This handsomely-illustrated 24-page booklet is based on the film and is filled with full-color pictures taken from the film.** ***It is yours for the asking!***

MONDAY MORNING TYPIST

UQly little gremilns
  Won IT you goawzy
Monday isn't lkie
  An ordinary daay.

L s aw you move tge wpace bar
  And jjam those keus bessides
Ufly lirtlg rimlens
  Damm yoru little hidese!

Beat it, scrsm, bwfore mi
  Fingers starrt to itch
To tear you ilmb frlm lmib—Oh,
  You goffzj ?(—*%"&" "$"?

A hostess, serving her guests wine, remarked to one gentleman: "I should not be offering you wine. You are the head of the Temperance League."

"Oh, no," he replied. "I am the head of the Vice League."

"Well," said the hostess, "I knew there was something I shouldn't offer you."

They say that Dartmouth has a statue of the famous revolutionary soldier, General Howe. It's hidden in the dark, deep interior of the library . . . and when the Dartmouth boys have their girls come up for the week-end, they take them to the library and show them Howe.

A concert was being held in a village schoolroom, and it became Sandy's turn to give his bagpipe solo. When he had finished and the applause had died down, a voice from the back shouted: "Give us Annie Laurie, Sandy!"

"What!" asked Sandy, surprised and flattered, "again?"

"Well, Aunt Mandy, I suppose you're mighty glad the war is over."

"Well, I jest don't know about dat," answered Mandy. "Cose, I'se glad to have Bill back home and all dat, but I jest know I ain't gwine to get money frum him so regular as I did when he wuz in de army and de government was handlin' his financial affairs."

Whoever named it "Necking" was strongly ignorant of anatomy.

A prominent bishop sat in a box in the opera house awaiting the curtain and watching the fair ladies in low cut evening gowns being ushered to their seats. After looking around the house with opera glasses, one of the ladies in the party said:

"Honestly, bishop, did you ever see anything like it in your life?"

"Never," gravely replied the bishop, "never, since I was weaned."

Johnny and Mary went into the country to pick wild flowers. Mary's mother went with them, so they picked wild flowers.

Pa: "You've been takin' vitamin pills and still feel run down? What have ya been eatin'?"

Ma: "Oh, do ya have to eat, too?"

Headline in N. Y. paper: "Father of Ten Shot—Mistaken for Rabbit."

Need for—

BORON IN AGRICULTURE

Authorities have recognized that the depletion of Boron in soil has been reflected in limited production and poor quality of numerous field and fruit crops.

Outstanding results have been obtained with the application of Borax in specific quantities or as part of the regular fertilizer mix, improving the quality and increasing the production of alfalfa and other legumes, table beets, sugar beets, apples, etc.

The work of the State Agricultural Stations and recommendations of the County Agents are steadily increasing the recognition of the need for Boron in agriculture. We are prepared to render every practical assistance.

Borax is economical and very little is required. It is conveniently packed in 100 lb. sacks and stocks are available for prompt delivery everywhere in the United States and Canada. Address your inquiries to the nearest office.

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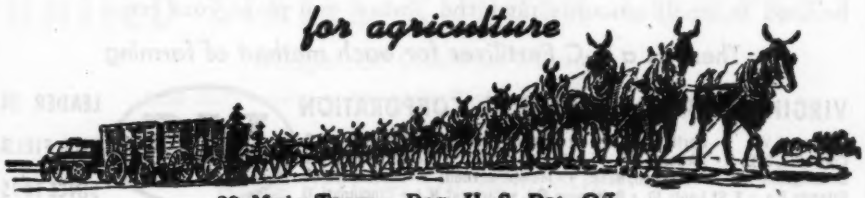
for agriculture



20 Mule Team. Reg. U. S. Pat. Off.

How to lead crops to water ...and make them drink food

V-C PLOW-SOLE FERTILIZERS are designed for the new method of applying plantfood at the bottom of the furrow directly on the plow-sole, out of reach of surface weeds.

V-C PLOW-SOLE FERTILIZER encourages plant roots to go down deep and find plantfoods where soil water is most abundant. The combination of V-C soluble plantfoods and subsurface water produces bigger yields. A heavy application of V-C PLOW-SOLE FERTILIZER keeps on feeding crops through the season, even during periods of dry weather.

V-C STARTER FERTILIZER should be used in small amounts near the surface for early growth. V-C PLOW-SOLE FERTILIZER should be used in a heavy application, down deep in moist soil, for later growth and maturity.

Three important points to remember about plow-sole application of fertilizer are: (1) Use it only for deep-rooted crops, (2) Use a heavy application, (3) Use an analysis, especially designed for this purpose, such as V-C PLOW-SOLE FERTILIZER.

Use a heavy application of V-C PLOW-SOLE FERTILIZER when you break your ground and a light application of V-C STARTER FERTILIZER when you plant your crop.

There is a V-C Fertilizer for each method of farming

VIRGINIA-CAROLINA CHEMICAL CORPORATION

Richmond, Va. • Norfolk, Va. • Greensboro, N. C. • Wilmington, N. C.
Columbia, S. C. • Atlanta, Ga. • Savannah, Ga. • Montgomery, Ala.
Birmingham, Ala • Jackson, Miss. • Memphis, Tenn. • Shreveport, La.
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VC FERTILIZERS

LEADER IN THE FIELD SINCE 1895

Useful Information for the Busy County Agent

Today the County Agent is guide and mentor to millions. His job of helping farmers grow better crops has taken on new proportions. Now he is directly responsible for the success of Victory Gardeners who are doing so much to increase America's food supply.

One subject on which the County Agent wants to be well-informed is the protection of seed against soil-borne and seed-surface fungi. Seed protection is important in any season—and is especially important in a cold, wet planting season like the one just past.

Write today for latest reports on the use of Spergon to protect seed; increase emergence; stimulate growth; improve stands and yields. Information about this non-injurious, easy-to-use seed treatment deserves a place in your working library.

Advantages of Spergon

- Safe to use—cannot harm delicate seeds, even when used in excess.
- Safe for user—non-poisonous and non-irritating to those applying it to seed.
- Long lasting—Spergon does not deteriorate with age; may be applied months in advance of planting.
- Self-lubricating. No graphite needed in drill.
- Compatible with legume inoculants.

TYPICAL DOSAGES

Corn	1½ oz. per bu. seed
Peas	2 oz. per bu. seed
Beans (including Limas)	2 oz. per bu. seed
Soybeans	2 oz. per bu. seed
Sorghum	1½ oz. per bu. seed
Flax	2 oz. per bu. seed
Peanuts	3 oz. per 100 lbs. seed

Spergon

Reg. U.S. Pat. Off.

SEED PROTECTANT

UNITED STATES RUBBER COMPANY

Naugatuck Chemical Division

1230 Sixth Avenue • Rockefeller Center • New York 20, N. Y.

Serving Through Science

THE PLANT SPEAKS

A new four-reel series of 16 mm., sound, color films which may be booked independently or in any combination. They may be used to best advantage when shown at least one day apart and in the following sequence:

THE PLANT SPEAKS THRU DEFICIENCY SYMPTOMS pictures soil depletion, erosion, and deficiency symptoms on plants. (Running time 25 min. on 800-ft. reel.)

THE PLANT SPEAKS, SOIL TESTS TELL US WHY depicts taking soil samples on the farm and the interpretation of soil tests. (Running time 10 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU TISSUE TESTS shows the value of tissue testing and the procedure for testing plant tissues in the field. (Running time 14 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU LEAF ANALYSIS evaluates leaves in plant growth and leaf analysis in determining fertilizer needs. (Running time 18 min. on 800-ft. reel.)

We shall be pleased to loan these films to agricultural colleges, experiment stations, county agents, vocational teachers, responsible farm organizations, and members of the fertilizer trade.

OTHER 16MM. COLOR FILMS AVAILABLE FOR TERRITORIES INDICATED

Potash in Southern Agriculture (South)
In the Clover (Northeast)
Bringing Citrus Quality to Market (West)
Machine Placement of Fertilizer (West)
Ladino Clover Pastures (West)
Potash from Soil to Plant (West)
Potash Deficiency in Grapes and Prunes (West)
New Soils from Old (Midwest)
Potash Production in America (All)
Save That Soil (All)

IMPORTANT

Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of time of loan.

American Potash Institute
1155 Sixteenth Street
Washington 6, D. C.

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